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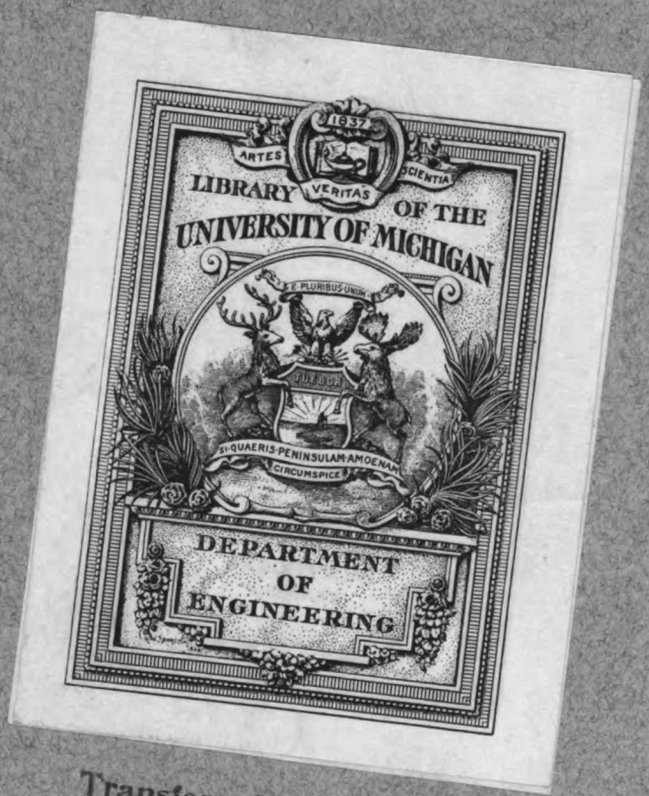

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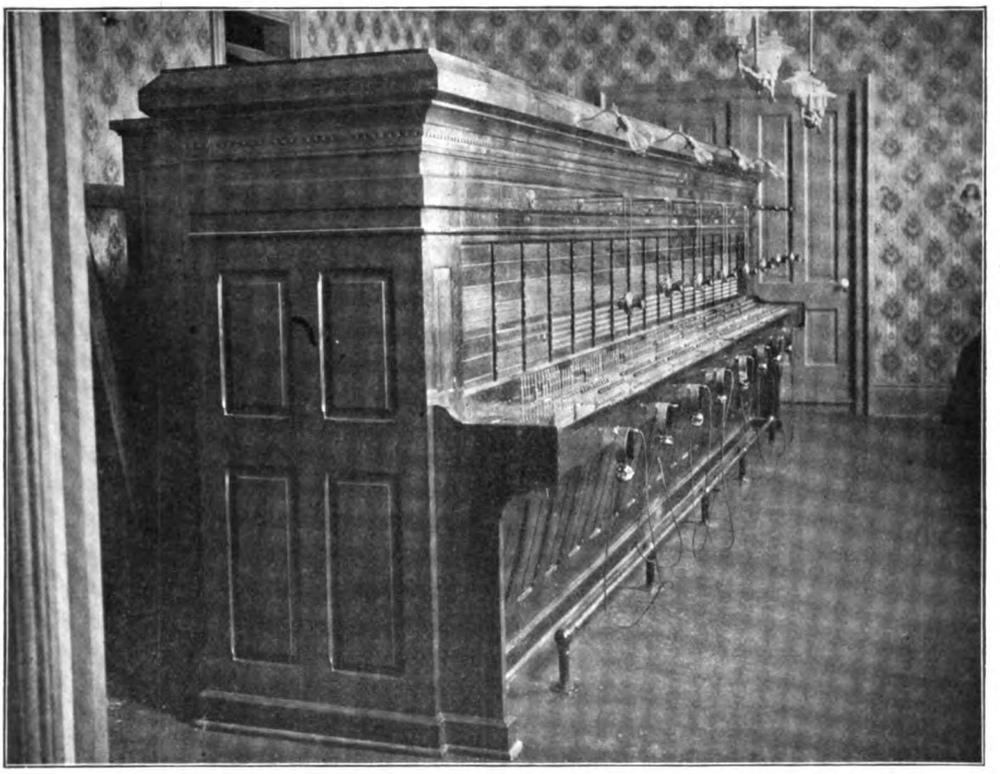

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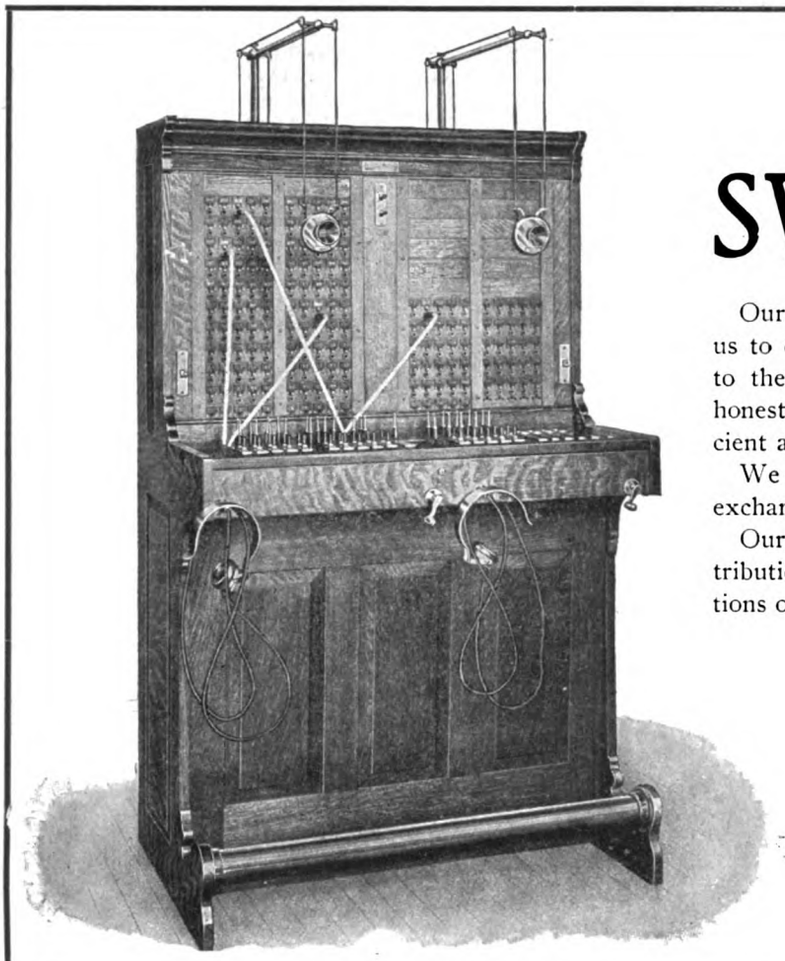

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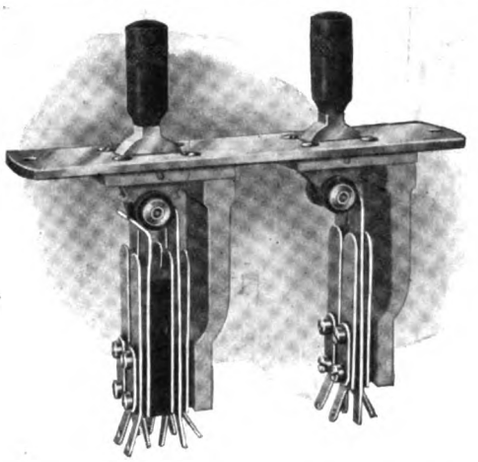

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Baker & Co.	1	Model Electric Co.	2
Baird Mfg. Co.	9	Monarch Electric & Wire Co.	43
Beidler, Francis, & Co.	48	Monarch Telephone Mfg. Co.	6
Benedict & Burnham Brass and Copper Co.	—	Moon Manufacturing Co.	—
Bissell Co., The F.	—	Morgan & Wright	—
Blakeslee Forging Co.	47	Mountain State Electric Co.	3
Boggs, J. S.	48	Mueller, William, Co.	46
Bruno Grosche & Co.	1	Nagel, W. G., Electric Co.	9
Buffalo Steel Co.	—	National Wire Corporation	50
Bull Tongue Land Anchor	8	Norfolk Creosoting Co.	49
Butterfield, J. F.	47	North Electric Co.	4
Cadiz Electric Co.	—	Nungesser Electric Battery Co.	—
Carbolineum Wood Preserving Co.	48	Okonite Co.	37
Central Telephone & Elec. Co.	43	Oliver Manufacturing Co.	44
Century Telephone Const. Co.	5	Page & Hill Co.	46
Connecticut Teleph. & Electric Co.	44	Pendleton & Gilkey	48
Cook, Frank B.	15	Pignolet, L. M.	1
Couch Co., S. H.	11	Pittsburg & L. Superior Iron Co.	46
Crumb, W. H., & Co.	49	Plume & Atwood Mfg. Co.	1
Dean Electric Co.	7	Porter Cedar Co.	48
Doubleday-Hill Electric Co.	—	Rock Island Battery Co.	9
Eastern Telephone Mfg. Co.	49	Roebling, John A., Sons Co.	50
Electric Appliance Co.	3	Roth Bros. & Co.	45
Electric Storage Battery Co.	3	Runzel Lenz Elec. Mfg. Co.	49
Ericsson Telephone Co.	47	Sand Point Cedar Co.	46
Ewing-Merkle Electric Co.	—	Schaper Construction Material Co.	44
Fahnestock Transmitter Co.	48	Simplex Electrical Co.	1
Farr Tel. & Const. Supply Co.	45	Spies Electric Co.	—
Fisk Newhall Tel. Mfg. Co.	14	Standard Underground Cable Co.	—
Frankel Display Fixture Co.	14	Stanton, L. W.	1 and 42
Gemmil Telephone & Mfg. Co.	—	Sterling Electric Co.	8
General Electric Securities Co.	50	Sterling, W. C., & Son	48
General Manifold Co.	11	Stromberg-Carlson Tel. Mfg. Co.	12 and 13
General Storage Battery Co.	47	Sumter Tel. Mfg. Co.	14
Gest, G. M.	42	Swedish American Telephone Co.	—
Gray Telephone Pay Station Co.	41	T. & A. Selective Call Co.	45
Haller Machine Co.	—	Telephone Printing Co.	49
Hallett Iron Works	2	Valentine-Clark Co.	—
Hemingway Glass Co.	—	Wanted, Situations, Etc.	41
Hipwell Mfg. Co.	—	Ward Leonard Elec. Co.	1
Indiana Rubber & Insulated Wire Co.	1	Weston Electrical Instrument Co.	47
International Telephone Mfg. Co.	47	Williams Telephone & Supply Co.	49
		Willyoung & Gibson Co.	—
		Wilson, J. I. M.	48

We were "IT"

AT THE CONVENTION

ASK ANYBODY THAT WAS THERE

Long Lived Cells

Rock Island Battery Co.

ROCK ISLAND ILLINOIS

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Kellogg Intercommunicating Systems

Are Perfect in Every Detail

No slightest part is experimental. Everything tried and thoroughly proved before leaving us.

Kellogg Switchboard and Supply Company

Congress and Green Streets, Chicago

New York	Philadelphia	Cleveland	Los Angeles
116 Nassau Street	Keystone Telephone Building	Electric Building	Seymour Building

Please mention THE AMERICAN TELEPHONE JOURNAL when writing to ADVERTISERS.

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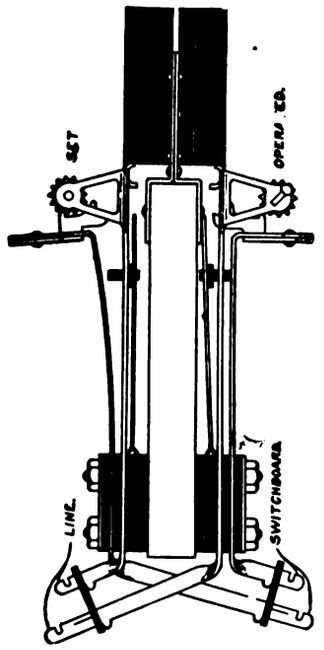
PROTECT YOUR SWITCHBOARD

against lightning and against either heavy or sneak currents with

COOK'S No. 8 SELF SOLDERING PROTECTOR



No bolt or soldered connections used in transposing the line and switchboard terminals.

Cook's Self Soldering Coil will *always* operate—on sneak currents, as well as on heavy currents.

Cook's No. 8 is the only protector covered by broad patents. Cook's test plug, which is sent **free** with all orders for No. 8 Protectors, is **the only test plug on the market covered by patents.** All others are infringements.

WRITE FOR PARTICULARS

Frank B. Cook.

Manufacturer

238 West Lake St. CHICAGO

OUR NO. 38

The Peer Of All Automatics

Easy to Connect Up

Inter Communicating Non Interfering

Central Battery

Can be arranged for Branch Exchange Systems with Connection to trunk lines.

S. H. COUCH CO.

162 Pearl St. :: :: :: Boston, Mass.

How to Make Two Blades of Grass Appear Where Only One Grew Before

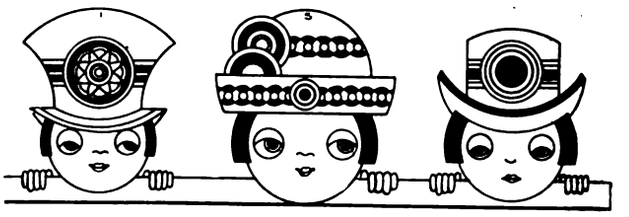
requires a certain amount of knowledge which costs time and money to acquire.

We will freely show you how to make duplicate copies of your toll and trouble tickets without the use of a separate carbon sheet if you will let us have your name and address.

Doesn't this proposition appeal to you?

General Manifold Company

FRANKLIN, PA.



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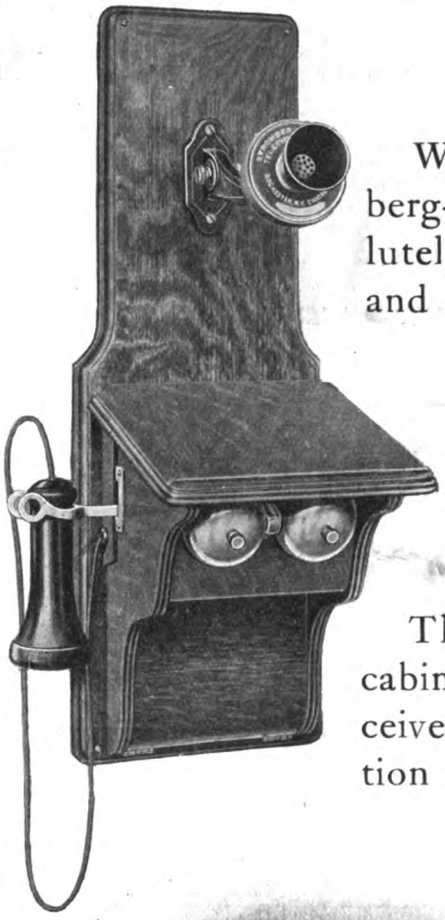
STROMBERG-CARLSON



Superior Quality

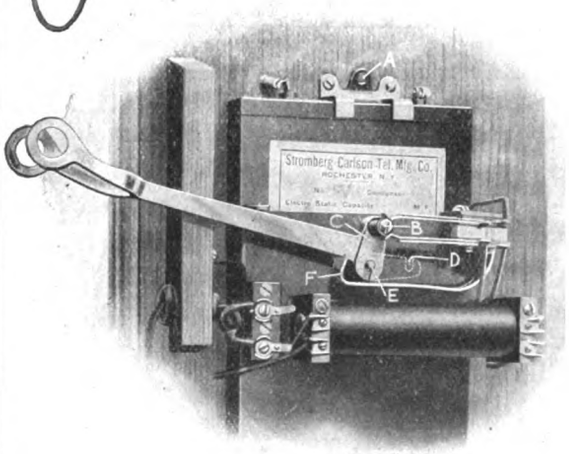
When we say superior quality we mean Stromberg-Carlson Telephone apparatus is made absolutely perfect in finish, perfect in workmanship, and close attention to every detail in manufacture.

These illustrations show what we call our No. 611 telephone. It's a good witness of the truth of the above statement.

Did you ever see a telephone as simple?

There are only two parts to the cabinet. Our transmitter and receiver, of course, need no introduction and it's sufficient to state that the other parts in the telephone are just as good.

The hookswitch can be easily removed if desired. The illustration shows this in detail.



A new bulletin on Central Energy telephones will soon be ready for distribution. May we mail you a copy?

TELEPHONE M'F'G. CO.

ROCHESTER, N.Y. CHICAGO, ILL.

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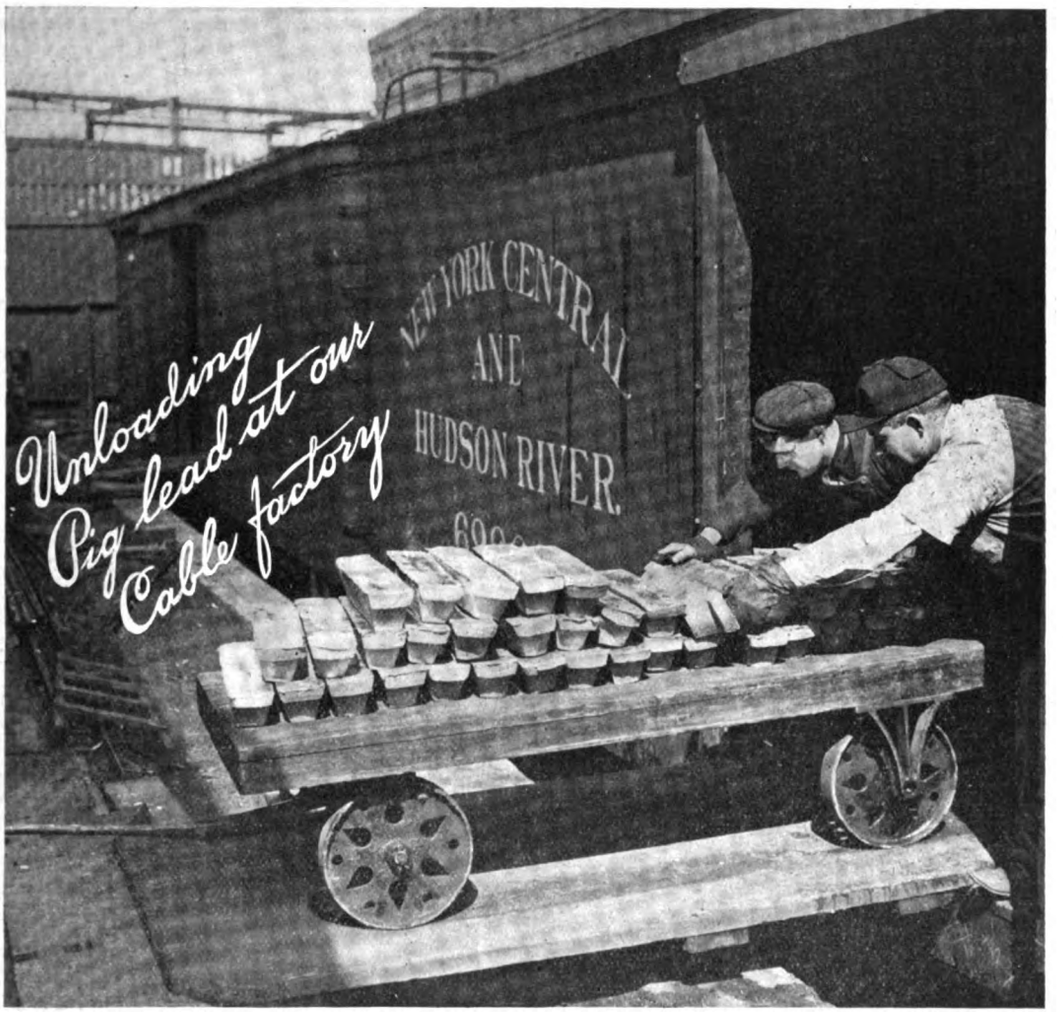
STROMBERG-CARLSON CABLE

Stromberg-Carlson Make Lead Cable



The cable sheath is composed of pure lead unless otherwise specified. It is sometimes mixed with 3 per cent of tin which gives an increased mechanical strength. This is done in Aerial Cables where the mechanical strength of the lead covering is an important item. Pure lead pipe is just as efficient for underground cable. The only mechanical strain to which underground cable is subjected is during pulling in, which should be done with great care.

Great care must be used in running the pipe so that the sheath will be of ***uniform thickness*** and density. This is followed by rigid inspection.

The surface of every foot of pipe is inspected for flaws or pin holes by experienced men. This produces a pipe as near perfect as experience, care and modern machinery can produce.

STROMBERG-CARLSON TELEPHONE MFG. CO.
ROCHESTER, N.Y. CHICAGO, ILL.

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SUMTER

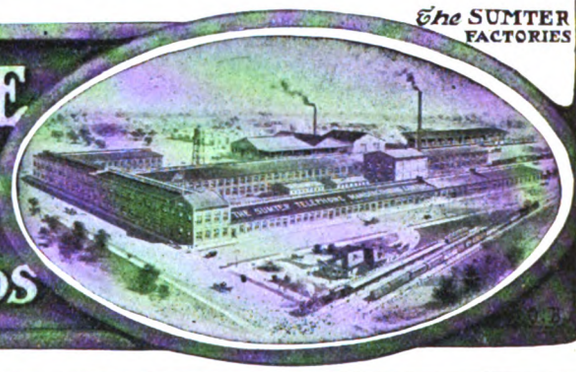
SOLD ON QUALITY—NOT ON PRICE

ARE YOU SATISFIED

with the results you are securing from your present apparatus. If there is any doubt in your mind that it could be improved, write at once for a trial order of Sumter telephones. Not till then will you know the appreciable difference there is between the ordinary kind and the Sumter kind.

SUMTER APPARATUS INCREASES DIVIDENDS

The SUMTER FACTORIES



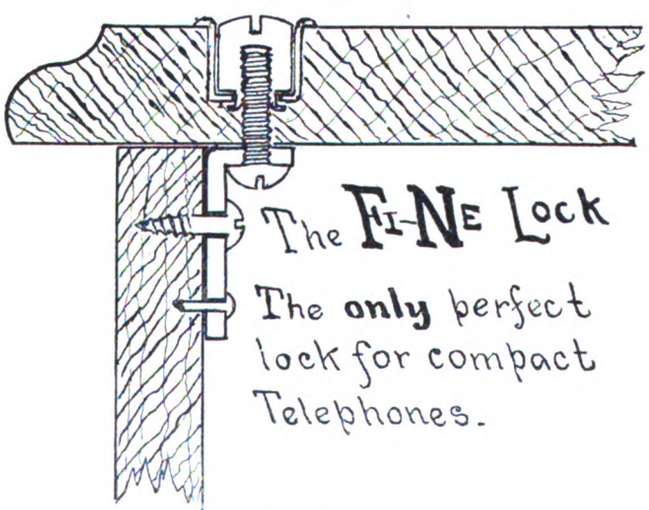
THE SUMTER TELEPHONE MANUFACTURING CO.

SUMTER, S.C., U.S.A.

TELEPHONES, SWITCHBOARDS

The Biggest Little Thing

we ever got up is



Specify the FI-NE LOCK
even tho' you order "other fellows" Phones

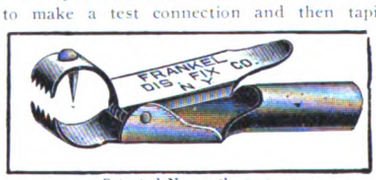
Other BIG THINGS are our FI-NE GENERATOR
FI-NE TUBULAR DROP

In fact ALL OUR STUFF IS FI-NE

FISK-NEWHALL TELEPHONE MFG. CO.
Chicago

TIME IS MONEY

Did you ever stop to think of the time taken up in skinning a wire to make a test connection and then taping up the exposed surface.



Patented Nov. 15th, 1904.

FRANKEL PATENT TESTING CLIPS SAVE THIS TIME

Sample Dozens, $1.50 per Dozen
100 lots, .11 each
500 lots, $ .10 each
1,000 " .09 "

FRANKEL DISPLAY FIXTURE CO.
718 Broadway—ELECTRICAL DEPARTMENT—New York.

OUR No. 3 GRADE MARLIN HANGERS

They cost a little more but are cheapest in the long run.
Pure American Hemp three-ply Houseline.
Re-galvanized Hooks.
Pays to buy that kind.

NATIONAL TELEPHONE SUPPLY CO.
1430 SUPERIOR STREET CLEVELAND, O.

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The American Telephone Journal

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VOLUME XII *SATURDAY, JULY, 1, 1905.* *NUMBER 1*

The Story of a Remarkable Feat

THE QUESTION

C. T. Mason, *President* F. C. Manning, *Vice-President and Secretary* C. G. Rowland, *Treasurer*
THE SUMTER TELEPHONE M'F'G. CO.
Incorporated
Manufacturers of
Telephones, Switchboards and Telephone Appliances
Sumter, S. C., U. S. A., June 26, 1905

HOW IN THE WORLD DID YOU ACCOMPLISH IT?
THE CONVENTION REPORT NUMBER ON THE 24TH.
CONGRATULATIONS AND BEST WISHES.

F. C. Manning.

THE ANSWER

We shall take the liberty of answering Mr. Manning's flattering inquiry in this public manner for two reasons:

FIRST: The answer tells a mighty interesting story, and

SECOND: It is beneficial once in a while to let our readers know of some of the things we are doing for them.

There is another reason, too, why the answer should be made in this public fashion. Without undue boasting we may safely say that in putting out under the circumstances a complete report of the National Interstate Convention, we accomplished a feat that has rarely, if ever, been equaled by a trade or technical publication no matter how old or how great. This is important to the Independent telephone operator and manufacturer, because it shows him more clearly than could any other incident, the enormous advance that has come in his industry. For, as a wise man said long ago, you can always judge an industry by its literature.

Only a short time ago, as telephone men will remember, reports of their national convention proceedings, did not reach the field until nearly or quite a month after the convention had adjourned. Naturally, interest in the matter had by that time pretty generally died down. Then came the closer arrangement by which THE AMERICAN TELEPHONE JOURNAL sent out a complete report two weeks after adjournment. This was quite a step, but it was followed shortly by a further cutting down of time, so that we managed during the last meetings of the National and of the Interstate convention to send out full reports within a

A GRIM SOUVENIR OF THE TWENTIETH CENTURY WRECK.

This fire-scarred envelope contained part of our National-Interstate Convention report that was coming by the fastest mail in the world.

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week of adjournment. Our friends generally thought this was about as far as we could go, but we determined to exceed even this record on the occasion of the first convention of the Amalgamated associations, and we succeeded though we had to overcome the most extraordinary and unlooked for complications.

The National Interstate Convention ended Thursday evening in Chicago. On Saturday morning THE AMERICAN TELEPHONE JOURNAL was out with a complete report. When the delegates reached their homes they found awaiting them copies of this paper, giving a sixteen-page account of the proceedings that lacked not a detail.

Ordinarily, this paper closes its reading matter forms on Wednesday morning of each week and its advertising on Tuesday. This enables us to get into the mails Friday evening with our regular forty-four page paper. The problem last week was to hold the forms open until Friday morning in order to carry the account of the final doings of Thursday evening. And, still more serious, we had to put a paper of sixty-eight pages to press instead of the usual forty-four pages, and to carry the story of a convention that was in progress in Chicago, a thousand miles away from the printing office where the paper had to be made ready.

To carry out this work, to get the big extra paper with its complete report into the mails Friday night required the most minute preparation in advance. Extra men were put on both in the mechanical and editorial departments, the decks were cleared and on Tuesday morning when the convention opened in Chicago we felt certain that everything would carry along, except for the unforeseen. But it was the unforeseen that happened. The convention was hardly declared open when its entire plans were upset by the tragic death of Mr. Sheerin, as recorded by us. Naturally all the carefully prepared arrangements for "handling" the convention matter were bowled out and we had to begin all over again and readjust ourselves to the new conditions. To do this required some rapid work and the free use of the telegraph and long distance telephone, for it must be borne in mind that one end of our machine was in Chicago and the other in New York, and that the two ends had to work constantly in harmony. By Tuesday night the readjustment had been made, and our correspondents by working the better part of the night had their copy covering Tuesday's proceedings, the description of the manufacturers' exhibits, preliminary matters and advance committee reports in shape to catch the Twentieth Century fast mail in Chicago early Wednesday afternoon. The rest of the matter, that is, Wednesday's proceedings, Thursday's proceedings and full committee reports were to follow by telegraph, and there were men at either end of the line ready to handle the matter expeditiously.

The Twentieth Century mail was due early Thursday morning in New York. Late on Wednesday night it was wrecked, as everyone now knows, at Mentor, Ohio. Nineteen lives were lost, the cars were ground into kindling wood and the mail matter was burned. Whether it was burned in whole or in part was the problem. This problem, as shown by the telegrams attached herewith, was not solved for us until the receipt of the telegram from the General Superintendent of the Railway Mail Service. This telegram was not received until Friday noon, though the query was sent by us early on Thursday as soon as it was known positively that our report was on the unfortunate train. The uncertainty kept matters tied up until Thursday afternoon when we decided in any event to send a duplicate report by telegraph. The telegrams that follow and the letter of instructions to our printers tell the rest of the story—except this, that Friday evening, just as we were putting the last of the sixteen-page report to press, the ill-fated mail report turned up. As shown by the facsimile of the envelope printed on the preceding page. it had gone literally through fire and water only to reach us too late to be of any use.

SOME GRAPHIC DOCUMENTS IN THE CASE.

(Telegram).

NEW YORK, June 22, 1905.

AMERICAN TELEPHONE JOURNAL,
Auditorium Hotel, Chicago, Ill.:

Where is copy? Not a line received. Must close copy ten, Friday morning.

AMERICAN TELEPHONE JOURNAL.

RUSH.

(Telegram).

CHICAGO, Ill., June 22d, 1905.

AMERICAN TELEPHONE JOURNAL,
116 Nassau Street, New York:

Tuesday and Wednesday morning, and exhibitors report in Twentieth Century wreck reported burned. Will rewrite and wire to-night.

AMERICAN TELEPHONE JOURNAL.

(Telegram).

NEW YORK, June 22, 1905.

J. E. WHITE,
General Superintendent Railroad Mail Service,
Washington, D. C.:

Please wire if any mail saved on "Twentieth Century," and when may expect here. We had important matter aboard.

AMERICAN TELEPHONE JOURNAL.

(Telegram).

WASHINGTON, June 23, 1905.

AMERICAN TELEPHONE JOURNAL,
New York.

Considerable quantity first-class mail saved from Mentor wreck, damaged condition, was returned to Cleveland, properly arranged, and forwarded yesterday.

GRANT, Acting General Superintendent.

(Telegram).

CHICAGO, June 22, 1905.

AMERICAN TELEPHONE JOURNAL,
116 Nassau Street, New York:

Report some mail saved. Wire me if yours received.

AMERICAN TELEPHONE JOURNAL.

(Telegram).

NEW YORK, June 22, 1905.

AMERICAN TELEPHONE JOURNAL,
Auditorium Hotel, Chicago, Ill.:

Nothing received. Have wired Washington for information. Better begin sending by wire full report soon after six as possible.

AMERICAN TELEPHONE JOURNAL.

(Telegram).

NEW YORK, June 22, 1905.

AMERICAN TELEPHONE JOURNAL,
Auditorium Hotel, Chicago, Ill.:

When will story begin coming? Must handle it to-night. Rush answer.

AMERICAN TELEPHONE JOURNAL.

(Telegram).

CHICAGO, June 22, 1905.

AMERICAN TELEPHONE JOURNAL,
116 Nassau Street, New York:

Will wire seven thousand words to-night. No exhibitors' report; can't duplicate; displays removed. Half second day you will receive Friday morning. Balance delegates' last committee report Friday about ten. That will close copy.

AMERICAN TELEPHONE JOURNAL.

LETTER.

THE TECHNICAL PRESS,
15 Vandewater Street, New York:

DEAR SIR:—We have just been advised that our convention copy was on the wrecked Twentieth Century Limited, and was burned. We are, therefore, compelled to have the entire report duplicated by telegraph. It will begin coming about seven or eight o'clock this evening. Mr. Latzke, Mr. Croft and Mr. Tyler will remain down here to handle it and get it in shape for the printers.

We take it that it will be possible to keep sending copy over during the night, to be set up by your night force. In this way we hope we can clean the whole thing up before seven o'clock to-morrow (Friday) morning. Will you please let me know if this is satisfactory, and if you will be in a position to handle it on this basis.

Yours truly,

THE AMERICAN TELEPHONE JOURNAL,
PAUL LATZKE, President.

NEW YORK, June 22, 1905.

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S. P. SHEERIN'S LAST ADDRESS.

Following is the text of the address that was to have been given before the National-Interstate Association. It was prepared in Indianapolis before Mr. Sheerin left for Chicago, and a copy just reached us this week.

ON behalf of the delegates present and the 2,500,000 telephone users in the United States whom we have the honor to represent, I thank you most sincerely for this cordial welcome to Chicago. Although the greater number of us only came in on this trip last night, we are by no means strangers in your beautiful city. Chicago has had most intimate relations with the Independent telephone movement since its very inception. Of the $250,000,000 invested in the business, at least $75,000,000 have been spent for switchboards, telephones and other equipment, and I am sure it is entirely safe to say that 80 per cent of this latter sum has been paid to Chicago manufacturers. The Chicago manufacturers, like all other good Chicagoans, have a way of getting there that is all their own.

We are glad, however, to be officially assured that we are welcome in Chicago. Your very excellent and enterprising newspapers have carried the word to us in our quiet homes that it is decidedly worth one's while in these days to be officially assured that he is welcome to Chicago. We are proud of Chicago, we are all in a greater or lesser degree contributors to her greatness. The telephone is the advance guard, the victorious skirmish line of commerce. The Independent telephone as a commercial agency has no equal to-day in the world. In the states immediately surrounding Chicago and naturally tributary to her there are to-day 950,000 Independent telephones knocking vigorously for admission. I hope you will not consider me ungracious if I suggest that Chicago needs the trade represented by these 950,000 telephone users quite as badly as they need Chicago.

We have given proof of the faith that is in us by the work I have indicated. We will spend $1,000,000 to build toll lines into Chicago, just as soon as Chicago is ready to receive them. We want the closest possible relations with you. We will come in and spend our money with you, if you will only kindly open your door. Again, sir, I thank you for this most hearty welcome. We are glad to be your guests, and will endeavor so to conduct ourselves as to merit the confidence and closer relationship of our host.

MEMORIAL RESOLUTIONS ADOPTED BY THE NATIONAL-INTERSTATE ASSOCIATION.

THE sad and untimely death in this hall yesterday of the Hon. S. P. Sheerin, president of the New Long Distance Telephone Company of Indianapolis, has cast a deep and melancholy shadow over the otherwise auspicious proceedings of this the ninth annual convention of the Independent telephone interests and the first annual meeting of the National-Interstate Telephone Association of the United States.

The sudden and tragic taking off of our brother only serves to emphasize the truth of the adage that death loves a shining mark. In the entire field of telephony a more conspicuous champion of the Independent movement, a more zealous laborer for our common cause and mutual good, could not have been found. He knew no season. At all times and in all places he proved his devotion to our dearest and best interests, and so faithful and unremitting were his efforts it may be truthfully said he died in the harness—in the very act of appealing to the greatest constituency on earth, the American people, for our just rights and a square deal.

He was a man of fertile resources and deep usefulness. The son of a mechanic and himself a laborer over the anvil, in his father's shop, he early demonstrated his skill and ability. His associates and neighbors, impressed by his faithfulness and worth, chose him to fill one of the important offices, that of Recorder in Cass County, Ind. From that he was promoted to the more noteworthy position of Clerk of the Supreme Court of Indiana. But meanwhile his reputation had grown beyond the confines of his State, and in 1888 he was selected and served until 1896 as the secretary of the Democratic National Committee. In whatever station he occupied, to whatever post he was chosen, he demonstrated that he was in every case equal to the demand. His rise and his successful civic career are admirable illustrations of the great possibilities that lie within the reach of the American youth endowed with a clear head and a brave heart.

His private life was clean. His habits were above reproach. Always genial and affable, he was none the less, when occasion demanded it, brave, assertive and tenacious. He was generous and forbearing, and his heart overflowed with sympathy for others whom sorrow or misfortune had overtaken. But above all things, he was loyal and true. Once admitted to his friendship, he bound you with bands of steel. Nothing could make him do a dishonest act or join with others in a questionable transaction. He held that the faith and trust of his friends was dearer to him than money or any kind of preferment.

In his death, Independent telephony has suffered an overwhelming and incalculable loss. Were he living he would still be with us shoulder to shoulder in the great struggle for fair competition and clean wholesome business methods.

The convention having been adjourned over yesterday out of respect for the memory of the deceased, therefore be it

Resolved, That copies of this memorial be entered on the records of the association and furnished to the sorrowing and bereaved family.

INDEPENDENT PLANT TO BE INSTALLED AGAIN AT MARION, INDIANA.

THE situation in Indiana is clearing up very satisfactorily, and there are encouraging signs of a closer alliance between Independent telephone companies than ever before. Following close on the consolidation of the interests of the United and the Central Union Telephone companies in the oil belt territory and the recent meeting of Independent telephone men in Fort Wayne, applications for franchises have been filed with the Board of Public Works of Marion for a new Independent company and for a long-distance telephone line through Marion. The first application was filed by Marion Evans, a prominent merchant, who represents the Independent company. He says, "The identity of the company will be disclosed in due time. The Independents do not intend to be frozen out of Marion, and that is simply the case in a nutshell. The company I represent wishes to build a telephone exchange in Marion for local and outside connections, and it is amply financed to put in a complete up-to-date system."

The long-distance application was filed by Oscar L. Garber, president of the Converse Electric Company. Mr. Garber explained to the Board of Public Works that the Converse telephone exchange had an average of 100 calls for Marion every day and that the sale of the United Telephone plant in Marion to the Central Union Company cut off all communication with Marion, except over wires operated by the Central Union Company. Both of these franchises will be granted, as the people are a unit in demanding their passage. So certain are the applicants that a room in the Western Union building has been rented for an exchange and a plant will be installed as soon as the franchise is granted. A wire between Converse and Marion has been strung on the poles used by a private telephone line.

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Theory and Construction of the Pole Changer

By George H. Conklin.

WHEN the telephone was first invented, one of the most serious problems presented for solution was the provision of a simple, economical and satisfactory method of signalling. The voice of the receiver was too faint to attract the attention of the subscriber, and the inventors had recourse to all sorts of devices to secure some means whereby the attention of the subscriber and the operator could be attracted and notice given that a message was to be received.

The ordinary vibrating electric bell would seem to have been the solution, but proved exceedingly unsatisfactory. First, the resistance of the line was so great that it was necessary to install a special battery in order to operate the bell. Then contacts were

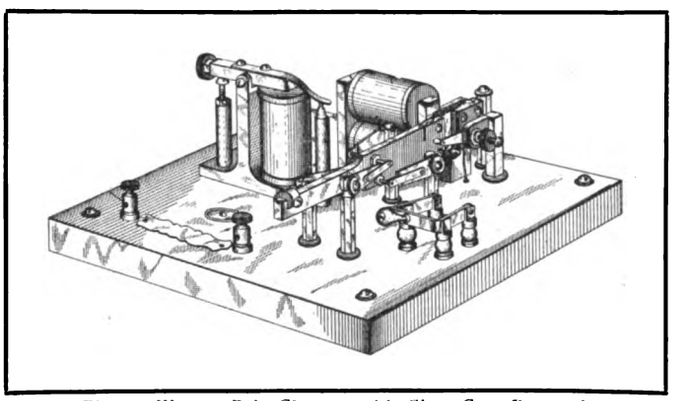

Fig. 1. Warner Pole Changer with Glass Case Removed.

found to be a source of continual annoyance and vexation, as they were certain to corrode and open the circuit, so that no signal could be sent. The invention of the magneto bell and the alternating current generator was the final solution. The magneto bell differs from the vibrating bell in that it is operated by an alternating current, and by this arrangement requires no contacts, consequently it does not need the maintenance which a contact device necessarily demands. The magneto bell has proved so satisfactory a solution of the signalling problem that it is universally employed; but, as it must be operated by an alternating current, it is necessary to provide this form of electrical energy for all cases where telephone signalling is required. This requisite produced the hand generator, a small alternating current dynamo machine so arranged as to be operated by hand. The hand generator was amply sufficient to meet all the demands of the substation, and answered equally well as a signalling apparatus for small offices; but the use of the hand generator adds considerably to the labor required of the operator in completing connections, for it is necessary for her to turn the crank of the generator for every call.

As the traffic in the central office increased it soon became evident that some other means must be devised, in order to relieve the operator. Naturally, the first expedient was to drive the hand generator, by some form of motive power, and so supply all of the operators with current, thus relieving each one from the necessity of turning a crank. This was the plan universally adopted in earlier exchanges, and is one which still continues in large offices where the demand for ringing current requires a considerable expenditure of energy. For the purpose all sorts of prime movers have been tried; water motors, gas engines and electric motors are the most common; but for the medium size office this method is expensive, because it requires the installation of machinery that is complicated, and necessitates considerable expense in the maintenance and operation of the apparatus. The actual time that a ringing generator is delivering current to the lines for signalling forms but a small fraction of the total of each day. Furthermore, the efficiency of a generator compared to that of large dynamo machines is very low.

The necessary quantity of electrical energy to signal substations can be cheaply supplied by a battery, assuming that a sufficient number of cells be arranged in series to provide requisite voltage to operate the bells through the resistance of the longest lines. But the battery gives continuous currents only; alternating currents are needed for single party lines, and pulsating currents for poly-station circuits. If the battery can be furnished with some means whereby its polarity can be reversed with sufficient frequency to secure an adequate alternating current, the first part of the problem is solved; and by arranging the reversing mechanism so that at pleasure either positive impulses or negative impulses only can be secured, the entire ringing solution is accomplished. This is the object of the pole changer.

In theory the apparatus consists of an electric magnet which is supplied with a vibrating armature, the end of which carries a pair of contacts. The electro-magnet is placed in circuit with one or two cells of a closed circuit battery. As soon as the circuit is completed the magnet is excited and the armature is attracted, and as it moves toward the magnet it opens the battery circuit. Then, as the magnet current is cut off, the electro-magnet loses its attractive power, the armature swings back, remaking the contact previously broken, and repeats the cycle thus described so long as the battery continues to supply energy.

So far the pole changer does not differ from the ordinary vibrating bell, which consists of a similar electro-magnet and oscillating armature. In the pole changer, however, the bell is omitted and the clapper replaced by the contact points previously described. These contact points are placed in a circuit containing such a number of open circuit cells as will provide the voltage requisite to ring the longest lines. The contacts on the end of the pole changer armature are so arranged that, as the armature swings to and fro, it connects the positive side of the battery first with one wire of the ringing circuit, and then with the other, and by this means it is apparent that the machine transmits to the ringing circuit pulsations of opposite polarity with every swing.

The Warner pole changer is shown in Fig. 1. A substantial base plate is provided, often of marble, slate or other insulating material, upon which the electro-magnets are mounted. In front of this magnet a swinging arm is arranged, as shown. At the end of this arm is a sliding weight, which may be moved to and fro. The object of this weight is to adjust the frequency with which the arm vibrates to such a pitch as may best suit the needs of the bells which are to be operated. On either side of the end of the armature are a pair of posts, which carry platinum points. Corresponding platinum contacts are provided on the armature, and hence, as it swings to and fro, contact is made first with one post and then with the other. The small switch, shown at the right hand of the armature, forms a means for connecting the circuit of the operating battery (the one which is used to excite the electro-magnet of the pole changer) and also the circuit from the ringing cells. In addition, on the left hand a second magnet and contact is seen, whose functions will be presently described.

(To be continued.)

OLD GERMAN BAPTIST BRETHREN HOLD THE TELEPHONE UNGODLY.

AT the national conference of the Old German Baptist Brethren, held at Flora, Ind., recently, the Advisory Board, after a heated discussion, decided that the members should not be permitted the use of a telephone in their homes, and that should any member now be using the telephone should take it out.

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New York's New Tariff Schedule---A Valuable Guide for Other States

THE special Tariff Committee, consisting of S. B. Rawson, T. S. Lane and Edward Davis, of the New York Independent Telephone Association submitted the following plan for handling the toll business of Independent Telephone Companies in the State of New York at the annual convention in Albany on June 16. It was unanimously adopted.

MILEAGE—The air line mileage between any two given stations shall be used as a basis for determining tariff between said stations. The United States Post Route map shall be adopted as a standard for determining air line distance. For the purpose of facilitating the computing of mileage tables the so-called Ohio block system shall be adopted, and mileage tables shall be made up of distances between centers of blocks, the air line distances adopted between any two stations being the distance between the centers of the respective blocks in which said stations are located.

Rates—Tariff rates based on a minimum charge of six-tenths cent per air line mileage for each conversation not exceeding three minutes duration shall be adopted, but special rates may be used to meet competition. The minimum rate between any two stations shall be fixed at ten cents. The following is a scale of rates (Table I) on air line distances, subject to correction by special rates necessary to meet competition:

TABLE I.

Stations in same block	.10
10 to 19½ miles	.15
20 " 24½ "	.20
25 " 29½ "	.25
30 " 34½ "	.30
35 " 39½ "	.35
40 " 44½ "	.35
45 " 49½ "	.45
50 " 59½ "	.50
60 " 69½ "	.55
70 " 79½ "	.60
80 " 89½ "	.65
90 " 99½ "	.70
100 " 119½ "	.75
120 " 139½ "	.85
140 " 159½ "	1.00
160 " 179½ "	1.10
180 " 200 "	1.20

The above rates subject to special rate charge to meet competition.

Time Limit—A three minute time limit for all toll messages shall be adopted. Charges shall be made as shown in Table II for each additional minute in excess of the three minute limit:

Night Rates.—Night rates as shown in Table III shall be charged between the hours of 6 P. M. and 6 A. M.

Division of Tariff Between Toll Line Companies and Exchanges Having no Toll Line Mileage—All stations originating toll messages shall be paid, as compensation therefor, a commission on all toll business originated whether sent paid or sent collect.

Division of Toll Revenue Between Toll Line Companies—In the division of toll revenue between toll line companies, after deducting the originating commission, the remainder of the total tariff shall be divided between the connecting companies in proportion to the ratio existing between the air line distances from point of origin to the point of transfer, or switching point, and the air line distances from the point of transfer to the point of destination, each toll line company assuming the mileage of and settlement with its own connections.

Reporting Toll Business—Each exchange, or toll line company, shall make a monthly report embodying a full statement of business sent and business received by it to the toll line company with which its settlements are made not later than the 10th of the following month.

Method of Handling Tolls—The following general rules shall govern the transmission of toll messages.

Toll operators at stations originating calls shall answer the calling party, she will immediately record them on a ticket furname and address of party with whom he desires to converse, operator to ascertain name, address and telephone number of calling party, she will immediately record same on a ticket furnished for that purpose. If a messenger is required to reach party wanted, or if there is a long delay, originating operator will report back to calling party. Operator at receiving station, when called, will answer by giving name of station only, and will record name and station of calling party; also name and address of party called. On completion of conversation both operators will record the following information on their respective tickets:

TABLE II.

First 3 mins.	Each addt'l min.	First 3 mins.	Each addt'l min.
		.95	.30
.10	.03	1.00	.35
.15	.05	1.05	.35
.20	.05	1.10	.35
.25	.05	1.15	.40
.30	.10	1.20	.40
.35	.10	1.30	.45
.40	.15	1.40	.50
.45	.15	1.50	.55
.50	.15	1.60	.55
.55	.20	1.70	.55
.60	.20	1.80	.60
.65	.20	1.90	.65
.70	.25	2.00	.65
.80	.25	2.25	.75
.85	.30	2.50	.85
.90	.30		

The use of time recording devices is recommended on all toll boards wherever practicable.

Time conversation commenced.

Time conversation was completed.

Amount of tariff.

Amount of messenger fee, if any, and if charges are reversed, tickets shall be stamped "Reversed."

Operators will immediately compare tickets on completion of call.

Handling of Franked Business—Operators will make a ticket for all messages sent and received. No ticket is to be marked "Deadhead." All business subject to frank shall be accounted for and reported in the regular manner as if paid tolls, and an adjustment of free business shall be made between connecting companies in their general settlements.

Toll Accounting—The following general plan for accounting toll business is recommended: All sent and received tickets shall be grouped according to the station with which business has been transacted, one group for each station, and the summaries entered daily on a toll ledger prepared for that purpose. The information shall be recorded as follows:

Amount of tolls sent paid.

Amount of tolls sent collect.

Amount of messenger fees collected.

Total number of messages received.

Amount of tolls received paid.

Amount of tolls received collect.

Messenger fees paid.

At the close of the month the footings on daily toll ledger shall be grouped on to a monthly check report, showing the totals

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of business between reporting station and each station to which it sends business and from which it receives business. This report shall be used as a basis in settlement of business between connecting companies.

Division of Tariff Between a Group of Companies and a Toll Line—The following plan shall be used for adjusting division of revenue between a group of companies operating in a limited district, each connected with the other, and one of which connects with a toll line and the connecting toll line: For division of revenue treat the group of connecting companies as a toll line company, allowing the grouped lines, air line mileage from various originating points to the point where its line meets those of the toll line company, and allow toll line company its mileage on the same basis. The toll line company shall settle with the line with which it immediately connects, and this line (one of the group) shall divide, the net revenue which it receives from settlement with main toll line among the other lines comprising the group in proportion to the mileage the line has in.

The formation of local associations by short line companies connecting and operating in a limited district is recommended, in which case the association may be treated as a toll line company in making settlement with other toll line companies with which it connects. In the division of tariff between two groups of short line companies, the same general plan shall apply, each group being considered as a toll line company.

Tickets—For reporting messages the adoption of a white ticket is recommended, approximately 3 x 4 inches, with space for telephone number of calling party, date, calling party's name, calling party's address, name of party called, address of party called, time conversation commenced, time completed, total minutes used, operator's number, amount of toll, amount of messenger, total charges for call, ticket to be printed "Sent." For recording received business use pink ticket printed "Received" otherwise same as sent ticket.

Daily Toll Ledgers—Daily ledgers shall be of one hundred pages, alternate sheets to be perforated, size about 8 x 10 inches, ruled as follows:

Offices, Number of messages sent, Overtime, Tolls sent paid, Tolls sent collect, Messenger fees collected, Number of messages received, Overtime, Tolls received paid, Tolls received collect, Messenger fees paid.

On the head of each page should appear the name of the originating station and station from which business has been received, or to which business has been sent. A separate page in daily toll ledger shall be used for each station with which reporting station does business, pages to have thirty-one (31) lines to enable reporting station to record on one sheet a full month's business between two stations.

Monthly Report Blanks—This report shall contain a summary of a month's business of a station. Single sheets shall be about 18 x 11½ inches, and headed as follows:

Check report of ..... office, month of ....., otherwise monthly check report to be ruled the same as daily toll ledger. This report shall contain a summary of daily toll ledger.

Methods of Determining Balances Due in General Settlement—The universal adoption of the following plan is recommended in arriving at settlements between exchanges and toll line companies and between toll line companies, company originating business to be charged with the following items:

Tolls sent paid.

Tolls received collect.

TABLE III.

Day Rate.	*Night Rate.*	*Day Rate.*	*Night Rate.*
.10	.10	.95	.50
.15	.15	1.00	.50
.20	.20	1.05	.55
.25	.25	1.10	.55
.30	.25	1.15	.60
.35	.25	1.20	.60
.40	.25	1.25	.65
.45	.25	1.30	.65
.50	.25	1.40	.70
.55	.30	1.50	.75
.60	.30	1.60	.80
.65	.35	1.70	.80
.70	.40	1.80	.90
.75	.40	1.90	.95
.80	.40	2.00	1.00
.85	.45	2.25	1.15
.90	.45	2.50	1.25

Messenger fees collected,

and to be given credit for the following items:

Messenger fees paid,

Commission,

Mileage, if any (as shown by mileage settlement).

Special Committee—The appointment of a special committee is recommended consisting of three, one of number of which shall be chairman, to whom all differences of opinion between connecting companies, relative to division of tariff, mileage allowances, etc., may be referred. This committee shall act in an advisory capacity only.

Multiple Testing Apparatus

By Edward A. Tyler.

ALL large telephone companies employ a night force of switchboard trouble men, whose duty it is to clear all trouble that it is impracticable to handle during the day. Among other duties one man is generally assigned to test the multiple for the purpose of locating any opens, crosses, or grounds which might not have manifested themselves. This multiple test is always made at the end section; that is, the one farthest from the junction of the cable leading from the intermediate frame with the switchboard multiple cables. Any trouble which occurs in the intervening sections is certain to manifest itself at the end

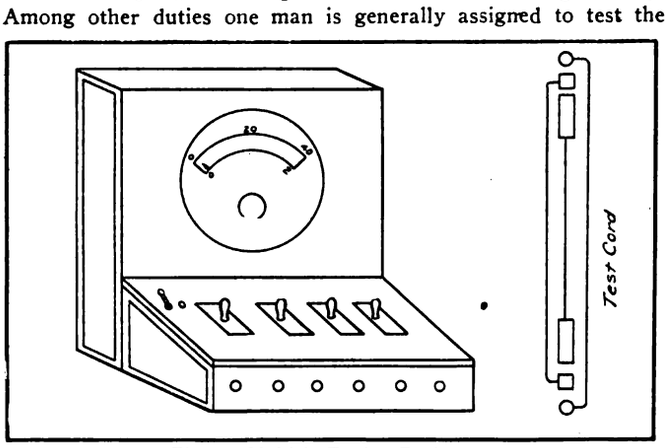

Fig. 1. Multiple Testing Equipment.

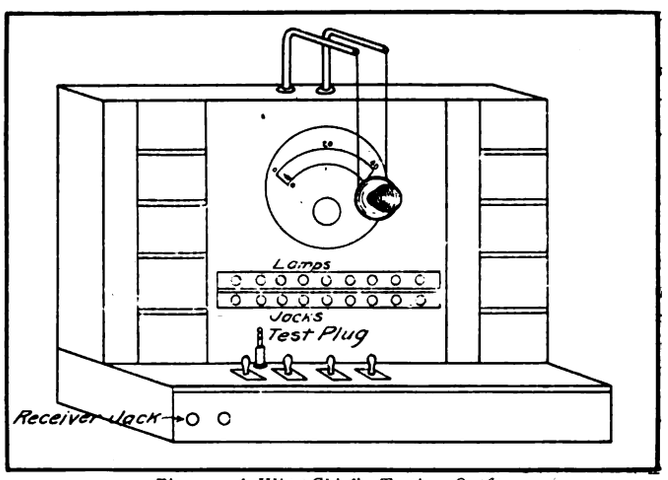

Fig. 3. A Wire Chief's Testing Outfit.

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multiple where the test is to be made. To enable this test to be made in the quickest and easiest manner, a voltmeter is frequently mounted in the last panel and the adjacent keyboard is wired for the necessary test keys. It is also customary to insert in place of the regular cord circuits, trouble and test cords, the use for which is as follows: When a cable gets in trouble one of the first indications in a central energy board will be the flashing of a number of line lamps associated with the circuits passing through, this being caused by their being either shunted or grounded. The operators failing to get any response to their answering signals, report to the supervisors, who have the lines plugged up upon the trouble cords in the end multiple above referred to. In three wire systems where the third or sleeve wire is used to operate cut-off relays this circuit alone is connected up on the trouble cords, as their only purpose is to extinguish the line lamps. In some cases, however, a number of these cords terminate at the wire chief's desk, so that he is enabled to test direct without having the lines to which they are connected transferred to test cords.

Where no special provision has been made for the multiple test some portable arrangement must be employed. This may take any form and be so arranged as to enable any required test to be made quickly. As a suggestion to those who may have occasion to devise this apparatus the following scheme is offered: Fig. 1 illustrates the equipment mounted in a convenient manner. A voltmeter having two scales, one reading from zero to 40 and the other from zero to 2, is supported in a vertical frame and placed so as to be easily read. On the slanting key shelf are mounted four keys, which operate in either direction, thus giving control of eight separate test circuits, and allowing a large variety of combinations without encroaching upon the limited space for circuit changing devices upon the keyboard.

In addition to these keys there is a single point switch which controls the operator's transmitter. In the front of the box is mounted a strip of six jacks, two of which are for the transmitter and receiver circuits, the other four supplying battery at different voltages and generator current for ringing.

This set is essentially designed for three wire central energy systems, but by slight modifications it can be adapted to two wire central energy or magneto boards. The circuits are shown in Fig. 2. All keys when in normal condition make contacts as shown. To the left of key *D* are two arrows, which will be used hereafter to distinguish the circuit combinations. Thus if key *A* is moved to operate springs in the direction of *x* the combination will be called *A x*. Similarly toward *Y A y*.

Key combinations and operations as follows: *A x* reverses tip and ring for tests for grounds on both sides of the line. *A y* opens sleeve circuit through cut-off relay. With key in normal position the cut-off relay is energized, opening the line from ground and battery through line relay. *B x* connects line to ringing current. *B y* is an open circuit, cutting out all test apparatus beyond. *C x* changes the test battery from 40 to 2 volts. The reason for the two test batteries and double scale voltmeter is this: if a line on test shows a dead ground or short circuit the needle with the 40 volt battery will be thrown all the way over, but if the two volt test circuit is used it may only give a reading of say 1.8 volt. This would indicate that the ground or short circuit is very near at hand on account of the resistance of the circuit being too low to affect the reading on the higher scale, yet it appreciably affects the one reading with the lower voltage.

The number of tests which it is possible to make with this set are ample for all ordinary purposes, and with slight modification in construction it would prove a very efficient general test set for small exchanges. Under this condition the circuits wired to jacks would be run direct to the various batteries and generator, necessitating only one for the operator's receiver. The vertical panel of the board would be enlarged to contain, besides the voltmeter, a strip of jacks conected with jacks or cords upon the switchboard, so that lines in trouble could be plugged through direct for the wire chief to test. Besides the testing apparatus, a wire chief's desk should have pigeon holes and compartments to contain the various records. A design embodying these features is shown in Fig. 3.

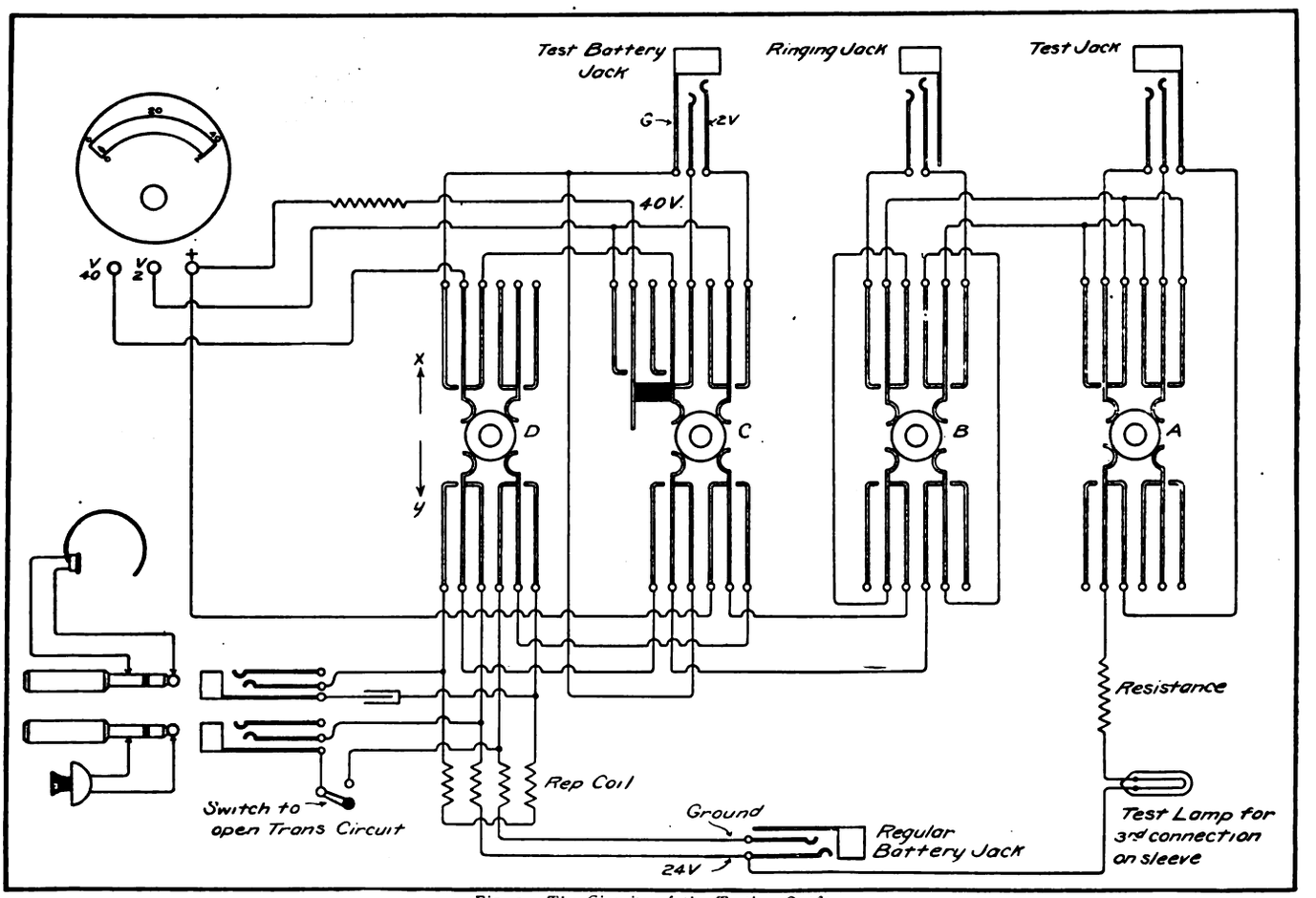

Fig. 2. The Circuits of the Testing Outfit.

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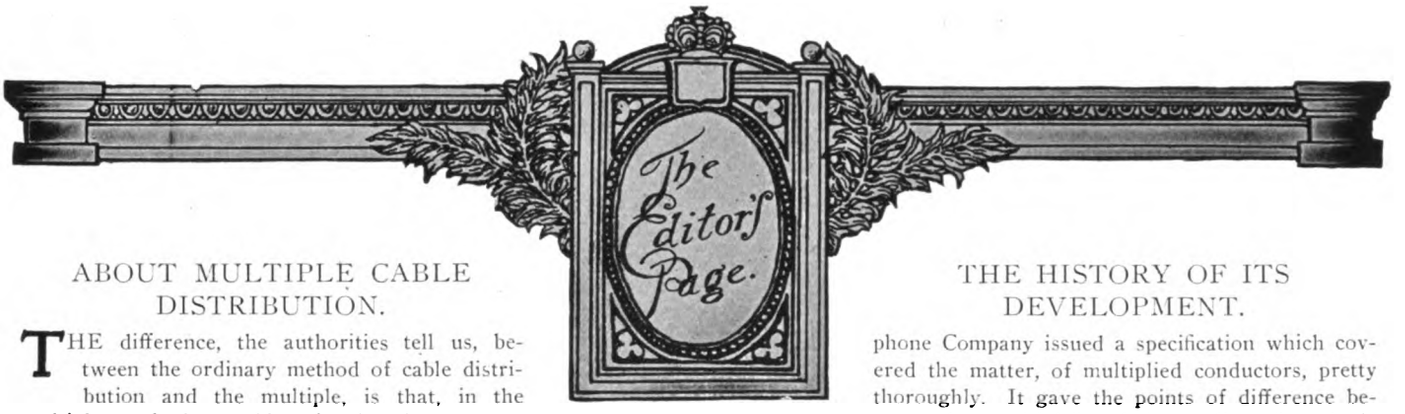

ABOUT MULTIPLE CABLE DISTRIBUTION.

THE HISTORY OF ITS DEVELOPMENT.

THE difference, the authorities tell us, between the ordinary method of cable distribution and the multiple, is that, in the multiple method, a cable wire has branches to several distributing points, while in the ordinary method, a cable wire goes to but one point. As is pretty generally known, when subscribers are grouped—as they generally are—the fluctuations or per cent changes are much less in small groups of subscribers than in large ones. In other words, the number of subscribers in a busy business block, is not apt to decrease very perceptibly, while, in an isolated suburban district, with few telephones, experience has shown that the per cent decrease may reach 50 or more. The engineer may accurately count the subscribers that he has to serve, in the business block, and specify a cable of a certain number of pairs as ample to supply that block. And he may feel pretty certain that the number will not decrease, that after a period there will not be lying dead, in the cable, a high percentage of pairs because of many subscribers having moved from the block. In the small isolated district the number of residents, and consequently the number of telephones, is constantly varying, so that if a cable of proper size were installed to serve that district, in a year, half of the former subscribers might have moved away and over 50 per cent. of the conductors would be unused in the cable and there would be no chance to even utilize them unless business in the district served would again prosper. Again the small group is more liable to a sudden proportionate increase than is the large one.

The aim of multiplying is to equalize the load on a cable by making it serve several small groups just as if they, combined, were one large one. When this is done, the designer can figure pretty closely on the number of cable conductors that will be required, and may feel reasonably certain that he is not installing many more or less than will be actually utilized. A tap is taken from the cable, to be multiplied, at several points, and conductors appear at each that also appear at others, so that if conditions are such that a pair can not be used at one terminal there are several others where it is available.

The history of the developments of the multiple tap method of cable distribution is interesting. This, like the other telephone methods, is the result of evolution, and is the work of no one man. Each of many has contributed his bit and others have gone on with it where the pioneers left off. Different engineers may utilize original methods, but these can vary only in detail. The general plan must remain the same. The first city that is recorded as having installed any multiple cable work was Denver, Colo. Here, some prior to 1891, a single cable was put in in accordance with multiple ideas by the Bell subsidiary operating there. It proved satisfactory. In 1891 in Albany, N. Y., the local Bell company applied the method to a whole system of cables. These two installations appear to be the pioneers. Subsequently the same methods were used in other localities and it was shown that both in conduit capacity and in the first cost of cable the new method was more economical than the "ordinary." From the information obtainable, there is no reason to believe that in either of these cases, there was any attempt at distributing from many terminals without open wire, as is the present practice.

In 1895 the Engineer's Department of the American Bell Telephone Company issued a specification which covered the matter, of multiplied conductors, pretty thoroughly. It gave the points of difference between the "multiple" and the "ordinary" methods and gave diagrams and data, which made obvious the economies of multiplying. A cable system was diagramatically worked out and it was shown that the first cost of cable used in the multiple method, to serve a given district, was 82 per cent of that where the ordinary methods were employed. In the total feet of duct occupied the multiple required but 80 per cent of that necessary for cables installed according to the ordinary practice. After this several Bell companies used multiple cable work to a more or less extent.

In the Bell specification of 1895 there was nothing said as to distributing directly from the terminals without crossarms or open wire. It only covered the matter of multiplying cable conductors, and it is to be inferred that the wireless distribution was a later development. In any event, about 1896, the Central District and Printing Telegraph Company of Pittsburgh started the extensive use of lead covered aerial cables, from which many multiple taps were taken to pole top terminals. Crossarms and open wire were done away with. It is pretty generally understood that Frank B. Hall, the company's district superintendent of construction, who is now an Independent engineer, was largely responsible for the development of the open wireless method.

The first Independent multiple tap installation that we have any record of was that placed in Wheeling, Va., in 1900 and 1901, by Frank B. Hall, who had left the C. D. & P. T. Co., and had taken a position as chief engineer with the National Telephone Company of West Virginia. The statement has been made, and so far as is known, has never been questioned, that the National Company's plant at Wheeling was the first full multiple cable telephone plant in the world.

To-day it may safely be said that the majority of multiple tap cable plants in the country are Independent and that Independent engineers have developed the method to its present state of perfection.

Some telephonists appear to believe that there is such a thing as "too much multiple." A delegate—a practical successful telephone man—to the recent New York State Independent Association at Albany, is responsible for the following statement:

> "Don't ever do it. If you do, you make a mistake. This multiple cable construction is the thing, but don't think it has got to be all multiple and no cable. Don't go too far into it. We as Americans are very prone to extremes. Multiple construction is a good thing, but don't work it to death."

The statement, doubtless, has truth in it, but no one who has made any study of the matter can dispute the economy that results from properly designed multiplying. After all is said and done the best engineer is the one who can build the best plant the cheapest—that is, cheapest in first cost and long run, too. If one can utilize a high percentage of his cable conductors by extensive multiplying and therefore be able to design the cable plant closely and make it low in cost, and if the plant shows low maintenance (and they all have done this), surely there can be no valid objection to the method. Some of the multiple tap plants have shown phenomenal trouble records—almost no trouble at all—and they have been in use long enough by now to develop trouble, if they ever are going to.

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National-Interstate Association Standard Operating Rules

Compiled by a committee composed of C. E. TARTE, CHAIRMAN, *Citizens Telephone Co., Grand Rapids, Mich.;* WM. MOELLERING, SECRETARY, *National Telephone & Telegraph Co., Fort Wayne, Ind.;* J. P. BOYLAN, *Cuyahoga Telephone Co., Cleveland, Ohio;* WM. HANDLAN, *National Telephone Company, Wheeling, W. Va.;* A. L. TETU, *Nashville Home Telephone Co., Nashville, Tenn.; and* A. B. CONKLIN, *Interstate Telephone Co., Aurora, Ill.*

These rules have been adopted as a standard by the National-Interstate Telephone Association.

EMPLOYEES shall thoroughly familiarize themselves with the following instructions. Ignorance of these instructions will not be accepted as an excuse for their non-observance.

2. Employees shall report promptly for duty at the hour designated, and shall not absent themselves from duty without first obtaining permission from their superior officer. If unable to report for duty at the hour assigned, an employee shall report as soon as possible, preferably by telephone, the cause and probable duration of the absence.

3. Employees shall be courteous in all their dealings with one another, and with the patrons of the company, and shall conduct themselves in a quiet and orderly manner while in the building.

4. While on duty in the operating room, employees shall hold no conversations with one another beyond that necessary in the proper performance of their work.

5. Employees in the operating room shall speak in low and distinct tones directly into the mouthpiece of the transmitter. The receivers must be retained at the ear continuously while the employees are on duty.

6. All employees in the operating room, except the Chief Operator and the Assistant Operator, are to be assigned personal numbers, by which they will be known in connection with the various records placed on the tickets, and in their dealings with the public.

7. No employee in the operating room, other than the Chief Operator and Assistant Chief Operator, shall give her name to any patron. If her name is requested, her number should be given.

8. Employees shall not divulge any information obtained from listening on telephone connections. The attention of employees is called to the fact that the law makes it an offense, punishable by a fine or imprisonment, to violate the secrecy of telephonic communications.

9. Employees are forbidden to receive from the public, written or oral communications for transmission or delivery to others. This does not apply to the repeating of messages or the making of appointments.

10. Employees are forbidden to use the circuits for connections that are not in the nature of the company's business requiring immediate attention, except when paid for. The use of the circuits for the company's business should be restricted to the smallest possible amount.

11. Employees shall keep the switchboard apparatus, which they use, in a neat and orderly condition. Keyboards must be kept free from everything not required for the handling of the service. When inserting or removing a plug, the employee shall not pull or push on the cord, but grasp the plug itself. When stamping a ticket on a calculagraph, the levers should be handled with care, and sudden and jerky movements avoided.

12. All employees, when ringing on lines, shall be careful to give clear and distinct rings.

13. All employees shall familiarize themselves with the code and with the signals used in the local offices for indicating "Busy," "Out of Order," etc., where such signals are used.

ORGANIZATION.

14. The force in the operating room shall consist of a Chief Operator, with Assistant Chief Operators, if necessary, Supervisors, Operators. Clerks and Office Messengers. The Chief Operator shall report to and be responsible to the Manager or Superintendent. The Supervisors shall report to the Chief Operator, and the different Operators, such as Recording, Line, Through, Desk, etc., shall report to the Supervisor who has charge of that part of the work with which they are associated. The Clerks and Office Messengers will report to the Chief Operator, but be under the supervision of the different Supervisors as they are employed in their divisions.

RESPONSIBILITIES AND DUTIES OF EMPLOYEES—CHIEF OPERATOR.

15. The Chief Operator shall be responsible to the Manager or Superintendent for the conduct and discipline of her operating force. She shall see that the operating rules are enforced, and will make such arrangements or recommendations as may be necessary to provide at all times a competent operating force for the handling of the business.

16. She shall prepare a schedule of the operators' working hours, so that the service will be properly handled at all hours.

17. She shall assign to each one of her subordinates, except the Assistant Chief Operators, a number to be used in place of her name or initials, in connections with her work in the operating room and in dealing with the public.

18. She shall see that all her subordinates are properly instructed in the details of operating and that such instructions are closely followed.

19. She shall see that the operating loads are properly distributed among the various operating positions, so that uniform service can be given with the greatest efficiency.

20. She shall see that her subordinates are supplied with and understand the rules regarding the proper routing of calls.

21. She shall see that the tickets, in connection with each day's business, are gone over with a view of adding any information that may have been omitted, or correcting any errors that may have been made by the operators in filling out the tickets. The calculagraph stamps on the tickets must be clear and accurate. When, on account of poor service, it is necessary to reduce the time of a connection from that indicated by the stamp of the calculagraph, these reductions in time shall be authorized and fully explained by the Chief Operator, and the corrected elapsed time written across the calculagraph impression. Special effort should be made to have the names of the patrons spelled correctly and written legibly on the tickets.

22. She shall see that all troubles, either on the lines or in the apparatus, are promptly reported to the Wire Chief.

23. She shall see that the switchboard apparatus is properly marked in a standard manner and that such markings are kept up-to-date.

24. She shall see that all complaints and miscellaneous requests from the patrons in connection with the service, are courteously received and promptly handled.

25. She shall report at once to the Manager or Superintendent any serious delays, troubles, loss of facilities, congestion of traffic, etc., and shall keep him advised upon all matters of importance.

26. She shall have the authority to employ and dismiss her subordinates, subject to the approval of the Manager or Superintendent.

27. She shall have the authority to cancel or reduce the charge for a message on which the service has been unsatisfactory, full explanation being made on the ticket, or on a memorandum record attached to the ticket.

28. She shall keep a log record of important daily occurrences.

29. In the absence of the Chief Operator, her duties shall be assumed by the Assistant next in authority.

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30. When necessary, she shall see that all messages are checked daily with their proper checking offices, between the hours of 10 o'clock p. m. and 7 o'clock a. m.

31. She shall keep a record of all the employees under her jurisdiction, this record to contain the operators' personal numbers, numbers of lockers, receivers, transmitters, number of errors made, punctuality, conduct, etc.

32. She shall see that no unauthorized persons are allowed in the operating room at any hour of the day or night, and that no visitors or employees of other departments are permitted to interfere with the work of the operating force.

SUPERVISORS.

33. The Supervisors shall be responsible to the Chief Operator for the quality of the work performed, and shall have direct charge of the operators in their respective divisions. They should personally superintend the work of each individual operator, coaching those who fall below the standard, reproving those who are careless and indifferent, and straightening out any minor difficulties that may occur in the routine of their work. They shall deal personally with all petty infringements of the rules or faults in operating, but in case of any serious trouble they should at once bring the matter to the attention of the Chief Operator. They shall straighten out, as they occur, any disputes between the operators in their divisions and the operators in other offices, and shall adjust, as far as possible, any disputes with patrons with respect to the service. Any disputes with the patrons or with other offices that they are not able to handle, they shall refer to the Chief Operator.

34. They shall see that all signals are answered promptly, and that good team work is obtained by co-operation between the adjacent operators.

35. They shall relieve the operators of any details which tend to prevent the prompt handling of calls.

36. They shall report to the Chief Operator any serious delays, troubles, loss of facilities, shortage of circuits, or congestion of traffic, busy local and office trunks, etc., and shall keep her advised on all matters of importance.

37. They shall see that the calls are promptly distributed and handled, and continually examine the tickets of their subordinates in order to detect errors, so that they may be corrected as they occur.

38. They shall gather the tickets that have been completed in their divisions at least every hour, and turn them over to the Chief Operator, or, in the larger offices, to the Ticket Clerk.

39. They shall take up delayed calls with the supervisors in other offices, as they are referred to them by the operators in their divisions.

40. They shall have a schedule of the employees in their respective divisions.

LINE AND RECORDING OPERATORS.

41. The Line and Recording Operators are responsible to their Supervisors for rendering accurate and rapid service to the patrons, free from all interruption, and for handling the company's lines in a businesslike manner, with the view of obtaining in their use the best possible efficiency.

42. They shall not refuse to carry out the requests or orders of distant operators unless previously and specially instructed to do so by their superior officers. Operators shall never dispute with one another over the circuits, or over methods of operating. Any difference affecting the service should always be referred to the Supervisor.

DESK OPERATORS.

43. In offices of sufficient size there shall be a Desk Operator, or Operators, if necessary, to handle and to keep records in connection with certain details of the toll operating, that it is not advisable to have the regular operators handle. The Desk Operators shall not put up connections of any portion of the regular routine business, but are to handle that portion of the operating that is exceptional, and that requires special attention.

44. They shall keep a record of all "leave word" calls as they are referred to them by the Line Operators, both in connection with "sent" and "received" tickets.

45. They shall keep a record of all appointment calls, both in "sent" and "received," and notify the Line Operators five minutes before the time of the appointment.

46. They shall, if practicable, repeat all messages on which the parties are unable to talk direct.

47. They, shall when requested, quote rates both to the patrons and to the operators.

48. They shall have copies of the local telephone and city directories, and shall, upon request from the Line Operators, look up numbers and addresses, and help locate parties called for. The telephone directory shall be kept up-to-date by daily entries of changes and additions in the list of subscribers.

49. They shall send all messengers.

50. They shall try upon request from the Line Operators "don't answer" and "busy" telephones, reporting back to the operators the results of their attempts to obtain the parties desired.

51. They shall answer miscellaneous questions in connection with the service, both from the public and from the operators. It is not the intention in any office where Desk Operators are employed, that any Line or Recording Operator should answer any question or supply any information, except in connection with the ordinary routine of her duty.

OFFICE MESSENGERS.

52. The Office Messengers shall be responsible for transferring tickets and orders in the operating room from one employee to another, when requested to do so.

TICKET CLERKS.

53. Ticket Clerks shall be responsible for arranging and sorting the tickets of an office and getting them ready for the toll accounting and billing department. The special details necessary for the clerks to follow in handling the tickets will be supplied by the Chief Operator.

TICKETS.

54. There shall be three forms of tickets used: "sent," "received" and "through" tickets. A "sent" or "received" ticket that is used for a night message shall have the word "night" endorsed across its face.

55. Tickets are to be filled out and reported for all calls made in connection with handling the service, except between Chief Operators and Wire Chiefs and their subordinates at instruments treated as part of the switchboard. Instruments that are considered to be part of the switchboard are Chief Operator's, Supervisors', Desk Operators', Recording Operators', Line Operators' and Wire Chief's sets.

HANDLING CALLS—RECORDING.

56. The Recording Operator shall answer the party calling by saying "Long Distance," and shall obtain and record on a "sent" ticket the following information:

1. The name of the person desiring service, if possible.
2. The telephone number of the party calling.
3. The initials and names of the particular person or persons desired.
4. The telephone number and name, or name and street address, or the name of the firm desired.

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5. The name of the place called for (City or Town, and State).

6. If the particular person desired is out, the further wishes of the parties.

57. In obtaining the above information, the Recording Operator shall allow the party calling to give the call in his own way without unnecessary interruption, asking only such questions as may be necessary to complete the ticket.

58. The Recording Operator shall verify the call, by repeating back to the party calling the details as received.

59. The Recording Operator, after having verified the call, will ask the party calling to hang up his receiver, first saying, "We will call you."

60. The Recording Operator shall record on the ticket the time received and her personal number, and then send it to the proper line operator.

61. The Recording Operator shall secure and record on "collect or "reversed" calls the name of the party calling, and shall write the word "collect" in the proper place on the ticket.

62. The Recording Operator, in case the party calling desires to talk at a specified time, shall write in the space headed "apt" the time at which he wishes to talk.

63. If the party calling desires to have a messenger sent to the address of party called for, the Recording Operator shall ascertain whether or not he wishes word left for the party called for, if out, to come to the telephone. If the party calling desires word left for the party called for, if out, to call, the Recording Operator shall write in the space headed "M. G.," the code symbol "L. W." If the party calling desires the call canceled, if the party called for is out, the Recording Operator shall write in the space headed "M. G.," the code symbol "C. C." The messenger charge will usually be paid on all calls by the party calling. On a "collect" or "reversed" call, if the party calling will guarantee the messenger charge, this charge can also be sent "collect," to be paid to the messenger, at the time, by the party called. If the party calling refuses to guarantee the messenger charge, the Recording Operator shall refer the patron to the Chief Operator, who will use her judgment as to the advisability of accepting the call.

64. If the party calling desires to obtain any one of two or more persons at the telephone of the party called for, the Recording Operator shall enter the names on the ticket in the order in which they are desired, separating the last two by the word "or."

65. If the party calling desires to place more than one call at the same time, the Recording Operator shall make out a separate ticket covering each call, and record on the back of each ticket a number to indicate the sequence in which the party calling desires the call completed, and fasten all the tickets together and send them to the Line Operator handling the line to the place called for on the first ticket. If the party calling desires to place more than one call at the same time, but does not care to have them completed in sequence, they shall be sent to the different Toll Line Operators as though they had been received separately.

66. The Recording Operator, in case part or the whole of the circuits to the place called for by the party calling are temporarily out of service, shall, when taking the call, notify the patron of the probable delay in completing the call.

67. The Recording Operator shall refer to the desk any requests for information which she cannot answer, such as points reached, rates, parties calling in connection with "leave word" calls, appointments, messengers, etc.

68. The Recording Operator, when requested for a report in connection with a call already placed, shall connect the patron to the Line Operator handling the call, if facilities are provided for doing so. If not, she shall obtain the information desired, and give the report to the patron direct, or connect the patron to the Desk Operator.

69. The Recording Operator, upon receiving a call from a telephone that requires an "O. K." from the proprietor or clerk in charge, shall, after the call has been taken, ask the patron to request the proprietor or clerk to come to the telephone, and the Recording Operator shall explain to him that a long distance call has been placed from his telephone, and shall ask that he collect the charges from the patron, and shall obtain the clerk's name. It is expected in most cases that these calls will come to the Recording Operator on recording trunks having a special designation on the lamp caps. If not, it will be necessary for the Recording Operator to have a list in front of her of all telephones requiring an "O. K."

70. The Recording Operator shall, if necessary, have a list of "barred" or "no toll" telephones at her position, and shall refuse to take calls for toll service from any of these telephone numbers. When arrangements are made so that the exchange operators refuse to give toll service from "barred" telephones, the list referred to above will not be necessary.

SENT CALLS.

71. The Line Operator, upon receiving a ticket from the Recording Operator, shall at once take up a line to the distant office, if one is available, and ring. At the same time, if she expects to complete the call within ten minutes, she shall take up the line of the party calling, without ringing, at the subscriber's multiple which is within her reach, or by means of a trunk to the switching position in the local exchange where the call originated.

72. If it is necessary in order to obtain the distant office to switch through one or more switching offices, the Line Operator shall take up the line to the proper switching office, as indicated by the route book, and ring.

73. When the operator at the office desired answers, the Line Operator shall say, "ticket," and pass the details of call in order as written on the ticket. The Distant Operator will verify the call by repeating back to the Line Operator the details of the call.

74. If the office desired is obtained through one or more switching offices, the Line Operator shall, when the Switching Operator answers, say, "———— (name of office desired) for ———— (name of office calling)." The Distant Operator will acknowledge order, and either make connections to a circuit to the office desired or to a second switching office, or take the details of the call as outlined under "Through Calls."

75. When the party called for has been obtained, the Distant Operator will notify the Line Operator, who will at once ring the party calling, whose line she has been holding, and when the party has answered, tell the party calling that the connection is ready.

76. Before connecting either of the parties to the line, the Line Operator and the Distant Operator shall speak to one another in order to assure themselves that the circuit is in condition for service.

77. The Line Operator shall then order the Distant Operator to connect the party called for to the line. She shall then connect her party to the line and start the conversation, stamping the ticket and monitoring the message by cutting in on the connection at frequent intervals, always being careful when doing so to cut out the transmitter.

78. At the end of the conversation when signaled by the

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operation of the supervisory signal, the Line Operator shall at once cut in on the connection, and if the conversation is finished, stamp the ticket, and take down the connection, first ringing on the toll line to clear the circuit. On calls from telephones requiring an "O. K." from the proprietor, the Line Operator, when the conversation is completed, shall at once report to the proprietor the amount of the charge for the service, and enter the charges and her number in the proper spaces on the ticket.

79. The Line Operator shall not hold a toll circuit after passing the call to the distant office unless requested to do so by the Distant Operator, or in case the circuit is built up through one or more switching stations, when the circuit may be held for five minutes in order to give the Distant Operator time to obtain the party called for, or at least a definite report. When a Line Operator is holding a toll circuit, and is waiting for the Distant Operator to obtain the party called for, or make a report, she shall cut in on the circuit at frequent intervals so as to prevent any other office from obtaining the circuit.

80. The Line Operator upon receiving a report from a distant office indicating that the connection will be delayed shall release the line of the party calling. Under no circumstances should the line of the party calling be held longer than ten minutes. When the Line Operator releases the line of the party calling, she shall tell the party the nature of the report, or reports, that have been received from the distant office, and make such additional reports at intervals as may be found necessary.

81. The Line Operators shall place on the back of the tickets the different reports received and sent, using the code as much as possible. The Line operator shall advise the party calling, immediately upon their receipt, of all reports requiring further instructions from the party calling. Any other reports that are received shall not be made to the party calling, except upon request or at the time of releasing the subscriber's line.

82. If the party called for cannot be located in the city or town given on the ticket, the Line Operator, when requested to do so, will agree to attempt to locate the party called for in one or more cities or towns that the party calling may suggest, if the party calling will agree to talk with the party called for at whatever point he is located.

83. When the party calling is out and cannot be reached by telephone, the Line Operator shall leave word with the party answering the telephone of the party calling, to call long distance by saying, "When Mr. ———— (name of the party calling) returns, have him call ———— (name of telephone company) Long Distance Operator (number of Line Operator's position)."

84. The Line Operator shall refer to the Supervisor all calls on which there have been a delay of twenty minutes, and on which no definite report has been received from the distant office.

85. The Line Operator, unless specially instructed to do so by her superior, shall not look up in their exchange directories numbers of parties called for at distant offices. If the Line Operator knows the number of the party called for, she shall supply it and pass to Distant Operator.

RECEIVED CALLS.

86. The Line Operator shall answer all incoming signals on the toll lines by giving the name of her office. She shall then take the details of all calls as given by the Distant Operators. The Line Operator shall verify the details on the calls by repeating back each item to the distant office.

87. The Line Operator shall, as soon as the ticket has been copied and verified, proceed at once to obtain the party called for.

88. If the Line Operator can secure the party called for at once, she shall hold the toll line circuit, requesting the Distant Operator to do the same. As stated under "Sent Calls," the toll line circuit, if it is switched through one or more offices, is to be held for a period of five minutes unless reported on before.

89. The Line Operator, after having obtained the party called for, shall notify the Distant Operator that the party has been obtained, and after assuring herself that the toll line circuit is in suitable condition for the proposed connection, shall, when ordered to do so by the Distant Operator, connect the line of the party called for to the toll line circuit.

90. The Line Operator, as soon as the conversation is started, shall cut out from the connection, noting the time of the connection on the ticket, and shall not cut in on the connection again unless signaled either by the subscriber or by the Distant Operator. If trouble comes in on a connection, it is expected that the Line Operator shall help make the necessary changes in the circuits, and stay in on the connection until the trouble has been removed.

91. The Line Operator, when signaled in on a connection, and finding that the conversation has apparently ceased, shall say, "———— (name of her station), are you waiting?" and allowing time for a reply, but receiving none, she shall say, "———— (name of her station), are you through?" If no response is received, she shall at once take down the connection.

92. The Line Operators shall not time the length of conversation on "received" messages, unless specially instructed to do so by their supervisors.

93. The Line Operator, not being able to locate the party from the information given on the ticket, shall refer the ticket to the desk.

94. The Line Operator, upon finding that the line of the party called is "busy" or "don't answer," shall, after making two attempts to secure the party, refer the ticket to the desk.

95. The Line Operator, upon obtaining a report in connection with a ticket, shall pass the report to the distant office. If no report has already been made, some form of a report should be sent to the distant office at the end of fifteen minutes from the time the call was received.

96. When the party called for is found to be out, and cannot be reached by telephone, the Line Operator shall leave word with the party answering the telephone of the party called for, to call long distance by saying, "When Mr. ———— (name of party called for) returns, have him call ———— (name of telephone company) long distance operator ———— (number of Line Operator's position)."

97. The Line Operator shall notify the desk of all "leave word" calls, giving the necessary details of the call to the Desk Operator.

98. The Line Operator shall look up in the telephone directory and supply all numbers of subscribers or firms that are not given in the distant office.

THROUGH CALLS.

99. Through or switching calls are divided into two classes, namely, "Straight Through" and "Relay" switches.

100. A "straight through" switch is one on which the Operator does not make any ticket or keep any record, unless specially instructed to do so by her Supervisor, or when the circuit called for is busy, and the Calling Operator desires the Through Operator to notify her when the circuit desired is idle. In this case, no details of the call shall be taken, the Through Operator simply writing on a through ticket the points between which it is desired to make connection and on the back of the ticket the time and the code N. C. A through ticket of this kind would be called an N. C. switch.

101. A "relay" switch is one on which a record is kept, a

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regular through ticket being filled out with the necessary details. These calls shall be handled by the through operators in a manner similar to methods outlined under "Sent" and "Received" calls.

102. A Line Operator answering a signal on a toll line in the usual way and finding that a distant office desires connection with a toll line to another office, will immediately, if the line is idle and the call is to be treated as a straight through switch, put up the connection at her position, remaining cut in on the connection until the second office has answered.

103. The Operator at the switching office shall now cut out from the connection and remain cut out until signaled in on the connection by one of the offices between which the connection has been established. The Operator at the switching office will be justified in cutting in on a through connection if she has reason to believe that the circuits are being unnecessarily held. When it is necessary to cut in on a through connection, the operator shall listen first without battery, and if apparently the conversation has ceased, cut in with battery and say, "———— (name of her station), are you waiting?" and allowing time for a reply and receiving none, shall say, "———— (name of her station) are you through?" If no response is received, she shall take down the connection.

104. The greatest care should be exercised by switching or through operators in handling through connections, not to disturb them in any way until the operators are sure that the conversations have been finished.

105. If the Line Operator is unable to put up a through connection at her position, she shall obtain the name of the place called for and give the order to the Through Operator to complete the connection, as "———— (name of place called for), for ———— (name of place calling)." The Through Operator will then handle the call as already described.

106. When a Line Operator or a Through Operator in an office have instructions to handle the details of the through calls to the place called for, they shall take the details of the calls, verify them, pass them to the proper terminating or switching office, and handle, supervise, monitor, time, etc., the calls as already described under "sent" and "received" calls.

107. Through or switching calls should never be neglected by the Line Operors. They should be considered of equal importance with the "sent" and "received" calls and handled in the order they are received.

108. Orders or reports in connection with through or switching calls shall be handled in the same way as the original calls.

APPOINTMENT CALLS.

109. Appointment calls and those on which the patron desires to talk at a specified time.

110. When the Line Operator receives an "appointment" call from the Recording Operator, she shall pass the ticket to the receiving office, the same as a regular "sent" call, not allowing this to interfere, however, with any regular "sent" or "received" calls that may be waiting at the time. The Operator at the terminating office, upon receiving the details of an appointment call from the sending office, shall ascertain if the party called for will talk at the appointed time and advise the sending office accordingly. In passing or receiving "appointment" calls, neither the toll line nor the line of the patron is to be held.

111. When there is a difference in the standard time between two offices, the time at the office at which the appointment is made shall govern and the Line Operator shall call the attention of the party called for to this difference in time.

112. After an appointment has been accepted, both the operators at the terminating and originating offices shall notify the Desk Operators in their offices, who will, in each case, keep a record of the call, and five minutes before the time of appointment, notify the Line Operators, and the Line Operators shall take up the lines of their respective patrons and proceed to complete the call in sufficient season to enable conversation to be started as nearly the appointed time as possible.

COLLECT OR REVERSED CALLS.

113. Collect or reversed calls are those on which the charges are paid at the receiving office.

114. The name of the party calling is to be obtained on all "collect" or "reversed" calls.

115. When a "collect" or "reversed" call is received from a distant office by a Line Operator, she shall proceed to obtain the party called for. When the party called for has been obtained, she shall notify him that a certain party at a certain town or city desires to talk to him, and wishes him to pay for the message. If party called for agrees to pay for the message, the Line Operator at the receiving office shall report to the Line Operator at the sending office that the call is "O. K. Collect," and proceed to complete the call.

116. In completing the connection, in starting conversation, in monitoring and in supervising on "collect" messages, the duties of the Line Operators at the sending and receiving offices shall be reversed, the Operator at the office at which the charge is to be paid being responsible for the connection.

117. If the party calling desires to have a message reversed after the conversation has been completed, the Line Operator shall refer the party calling to the Chief Operator, who shall reverse the message if it is agreeable to all parties concerned.

MESSAGE CALLS.

118. A "messenger" call is a call on which the services of a "messenger" is required in order to secure the party called for.

119. The Line Operator shall pass a "messenger" call the same as already described under "sent" and "received" calls, only the toll line and the line of the subscriber shall not be held.

120. The Line Operator at the receiving office upon receiving a "messenger" call, shall notify at once the Desk Operator, who shall send the messenger and notify the Line Operator of the nature of the report received. The Line Operator shall then pass the proper report, including the amount of the messenger charge, to the sending office.

121. When the connection is ready, the call shall be handled as already described under the "sent" and "received" calls.

PAY STATION CALLS.

122. A pay station call is a call terminating or originating at a public telephone.

123. Pay station calls in general are handled the same as "sent" and "received" calls, as already described, except in the matter of handling the collection of charges. On a call from a pay station, the charges can be sent "collect," except when the party called for is at a second pay station. In this case, the charges shall be collected from the originating pay station. Exceptions can only be made to this rule by the Chief Operator.

124. In those offices where the pay station lines end at toll sections with the multiple of all the toll lines within reach of the pay station Operator, this Operator shall record and send all the calls originating from the pay station telephones.

Calls received from distant offices for pay stations will ordinarily be handled by the Line Operators receiving the calls. In some offices, all calls to and from the pay stations will be handled at one position or section of the toll board.

125. If the pay station has a regular attendant or clerk responsible for the telephone, the pay station Operator shall com-

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pute and give the amount of the charges to the attendant or clerk immediately at the end of the conversation.

126. If the pay station is an automatic pay station, the Operator shall have the patron deposit the proper amount for the initial period before completing the connection. At the same time the Operator shall tell the patron that if he talks longer than the initial period, it will be necessary for her to interrupt him and ask him to deposit the proper amount for each additional minute that he may desire to talk. When the initial period has been completed, the Operator shall go in on the connection and notify the patron that the time of the initial period has elapsed, and ask the patron to deposit the proper amount for any additional minutes that he may desire to talk.

REPEATING MESSAGES.

127. If the parties desire, a message may be repeated. The charge to be made for the connection will be determined by the Supervisor.

128. Every effort should be made by the Line Operators to get the parties to talk with one another direct before repeating the message.

129. The repeating of messages should ordinarily be done at an office in the center of the line.

130. The repeating of messages is to be done, if practicable, by the Desk Operator, and not by the Line Operators.

LOST CALLS.

131. All calls not completed by midnight are to be canceled and considered lost calls for that day's business. The Chief Operator, on the following morning, shall take out from the previous day's tickets such lost calls as she thinks there is a possibility of reviving and make every effort to complete them. A record should be kept of all lost calls of a previous day's business that on any day are revived and completed.

132. A call that has been canceled can be tried again and put through at any time during a day's business if the party called for is obtained and if the party calling desires to have the connection completed.

133. Toll Operators shall make every effort to complete calls before canceling them.

134. A call that has been canceled and is afterwards covered by another ticket, which is completed on the same day, shall be pinned to the second ticket and become a part of it and shall not be considered a lost call.

135. "Dead head" calls that are lost, shall be considered separate from the calls from the regular patrons.

136. All lost calls shall have the word "Lost" stamped across their face.

CHARGES.

137. The rates to be charged on conversations are given in the rate book, and are for an initial period of three minutes and for each additional minute over the initial period. Day and night rates are given in the rate book. Three and one-fourth minutes shall be considered the same time as the initial period. Any fraction of a minute more than one-fourth shall be charged as an additional minute.

138. The change from day to night rate, and vice versa, shall be made at 6 o'clock p. m. and 6 o'clock a. m., respectively. A message beginning in the day period and extending into the night period, shall be charged for at the day rate for the time of the initial period and the number of additional minutes consumed before 6 o'clock, and at the night rate for the remaining minutes of the connection. For instance, a message beginning at 5:58 p. m. which is completed at 6:05 p. m., shall be charged as three minutes at the day rate, and four minutes at the night rate. The same rule shall govern from night to day rates.

139. A message should be charged to one of the two telephones between which the conversation is held. When a patron desires a charge transferred to a third telephone, the Line Operator shall refer the patron to the Chief Operator, who shall follow the instructions that have been given her for handling requests of this kind.

140. When a party is inaccessible by telephone, and a messenger is sent to his address notifying him to come to a pay station, the expense of this messenger will usually be charged to the party calling. However, if the party calling will guarantee the charge, the messenger charge may be collected from the party called for, the charge being collected by the messenger.

141. The party calling shall, in all cases when a messenger is necessary, be charged the amount reported by the receiving office.

CODE SYMBOLS.

142. The Code Symbols to be used are given in the following list:

A B.	Any one who can talk business.
Apt.	Appointment.
A. Y.	Any one.
B. Y.	Busy.
C. A.	Cancel.
D. A.	Did not answer.
E. K.	Eastern time.
G. B. A.	Give better address.
L. K.	Telephone reached and looking for party.
L. W.	Leave word.
M. G.	Messenger.
N. C.	No circuit available.
N. D.	Absent—not expected to-day.
N. F.	No telephone listed.
N. H.	Not there.
N. R.	No report to give.
U.	Out. Expected at ——— (time).
U. D.	Out. Do not know when the party will return.
U. N.	Unknown.
W. H.	We have.

General Rules and Regulations

VISITORS.

NO person except officers and employes of this company whose duty brings them in connection with the switchboard will be allowed to enter the operating room except by special permission from the general manager. Neither the chief operator nor any of her subordinates shall be allowed to conduct visitors about the operating room.

BUSY TRUNKS.

A record of the number of times all trunk lines between exchanges are reported busy, will be maintained during the first week of every month and forwarded to the proper official.

PEG COUNTS.

Peg counts will be kept on the first and third Monday of each month. In computing lines and stations for peg count information, the number of subscribers' circuits in use on the switchboard shall constitute total number of lines, and the number of subscribers' telephones, extension sets, and stations connecting with private branch exchanges, the total number of stations.

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SERVICE COMPLAINTS.

All verbal service complaints shall be made out on form provided for that purpose. The telephone number, the date and time reported, and the name of the party who makes the complaint will be recorded. It will not be necessary to enter the subscriber's name or address on this report. The party taking the complaint will sign same in the lower right hand corner. If complaint is due to operating, it will be forwarded immediately to the chief operator. If it appears to be due to interference on a party line circuit or any other trouble caused by a subscriber, it will be forwarded to the complaint adjuster, and if due to mechanical trouble, it will be referred to the wire chief. Any criticism whatsoever of the service will be considered a complaint and so recorded.

FIRE DRILLS.

The switchboard fire drill shall be held on the fourth Saturday of every month at the time when each division of operators go to lunch. The same rules as those employed for operators going off duty will be observed in the fire drill, with the single exception that the call bell will give three successive taps instead of one when operators are waiting for the signal to leave the room. The operators then, instead of marching to the recreation room will move to and through the door leading to fire escape, thence down the fire escape to the floor below, where they will re-enter the building and march in order to the recreation room.

EMERGENCY LIGHTS.

In the event of a fuse blowing, or any other emergency occurring which would interfere with the lighting facilities in the operating room, the switch directly in the rear of the assistant chief operator's desk will be thrown, connecting an eight C. P. battery lamp over each section of the switchboard. This circuit works off the storage batteries and is to be used only in case of emergency, as stated. The chief operator shall satisfy herself that all of her assistants understand the use of the switch and how to operate it.

EMERGENCY BELL.

A call button located at the assistant chief operator's desk will operate a large single stroke gong in the wire chief's office and equipment department. The following signal code will be observed:

One tap will indicate that a switchboard man is wanted.

Two taps that a switchboard man is wanted immediately.

Five or more taps will be an alarm of fire.

In the event of a fire call, the various trouble clerks, line testers, etc., will proceed in order to the operating room, each one to his definite task as assigned him at the latest fire drill.

DAMAGE TO PLANT.

In case of any emergency at night, such as fire, damage by water, or any accident which would cause a suspension of the service or endanger the plant, the night watchman should be called at once, and also the first obtainable officer of a list, taken in order beginning with the exchange manager and ending with the general manager.

In case of any similar emergency at night on the outside, particularly where aerial wires or cables have broken down so as to endanger public safety, the night wire chief will be advised immediately. He in turn will communicate with the district inspector or trouble man living nearest to the location of such trouble, and the inspector after investigating will report his findings as soon as possible to the night wire chief by telephone. If it is deemed advisable the night wire chief will confer with the first obtainable officer, beginning with the general foreman and ending with the general manager.

CHIEF OPERATORS' MEETING.

The chief operator of each exchange and the superintendent and monitors of the central exchange will meet with the central exchange manager at the latter's office on the first and third Thursdays of each month at 2 p. m., to discuss matters incident to and for the betterment of the general service.

PAYROLL.

The operating payroll should be in readiness not later than noon of the first and sixteenth day of each month, and the list of recommendations for changes in payroll should be delivered to the manager's office not later than 20th of each month.

APPLICANTS FOR POSITIONS.

Applicants for the position of operator will be received at the office of the exchange manager every Thursday afternoon at two o'clock, where a committee composed of the chief operator and manager will interview and grade them according to their qualifications. Applicants of the higher grade, as determined by committee, will be sent for first, regardless of the date of their application. Written applications will be answered and applicants instructed to report at the time specified above.

Applicants should be selected according to the following requirements: First, perfect hearing and eyesight; second, they should be bright and quick of action; third, clear, pleasant voice; fourth, sound nerves and good general health; fifth, of good character, as evidenced by recommendations.

CHIEF OPERATOR.

The chief operator will be responsible to the manager for the service given by the office, both to other central offices and to the subscribers collectively and individually, during those hours in which the traffic is handled by the operators under her charge. She should have a thorough knowledge of the capacity and skill of every girl under her charge, in order that she may assign to each such operator the care of that position with which she is likely to make the best success.

If she be given authority as to the disposition and handling of the force she is also expected to produce results. She is directly concerned in seeing that the standard of service is maintained at a proper level. It is to her that the manager looks to keep out complaints. She sees that the board is properly covered, and the operators are so arranged as to handle their work in the most efficient manner at all times and seasons. She discusses all complaints received regarding the service with the operator concerned, and she also takes the necessary precautions to prevent a repetition of the trouble. She is expected to spend a certain portion of each day in listening in from the desk upon various operators to determine their efficiency.

She should see that no unauthorized persons are allowed in the operating room at any hour of the day or night, and that no visitors or employees of other departments are permitted to interfere with the work of the operating force. She should familiarize herself with the names of the managers and chief operators of the different branch exchanges, so that matters pertaining to the service can be taken up personally with them.

She should see that the exchange clock is kept as nearly correct as possible, by conferring with the local authority on time. She is responsible for the maintenance of proper discipline in the exchange, and for the orderly and quiet behavior of the operators during business hours and while in the building.

Not only has she to give first-class service, to keep strict discipline, to set every one of her subordinates a definite task, and to see that that task is properly performed, but she has to settle all the little quarrels and grievances that spring up between operators; to smooth out jealousies; to determine questions of

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responsibility; to look after those operators who are ill; to give concessions to this one and that without incurring any suspicion of partiality or causing any friction. Finally, she should have patience, good temper, ability to act at a moment's notice in an emergency, the faculty of never missing little things, the gift of inspiring confidence in her subordinates, and, last and best of all, diplomacy.

ASSISTANT CHIEF OPERATOR.

When the chief operator is present and in charge of the office, the assistant chief operator acts in the capacity of complaint adjuster. The work she is called upon to perform while thus employed is practically examining into and determining the cause of the subscriber's verbal or written complaints of the service, and she will see that all verbal complaints are filled out on a form provided for that purpose. On the reverse side of such form, record is made of irregularities found and the remedy applied.

After the cause of trouble has been located and removed, the adjuster will communicate with the subscriber and ascertain if he is experiencing any further trouble. If not, the slip will be filed for future reference in an open envelope, one of which has been provided for each line circuit, and arranged in numerical order.

On all complaints, whether received verbally or by mail, the adjuster will first determine from the complaint file the subscriber's past trouble, and be guided accordingly in adjusting latest case. In no event will a service complaint be filed, until complaining party acknowledges the information, that the matter reported has been adjusted to his satisfaction. The complaint adjuster will keep in touch with the subscriber during the time the trouble is being investigated, and every assurance given him that his complaint is receiving due attention.

For the adjusting of party line complaints it has been decided to adopt as standard, a maximum of sixty calls per day for a four party line business circuit, or a total of fifteen calls per day for each subscriber, and a maximum of forty calls per day for a four party line residence circuit, or a total of ten calls per day for each subscriber. On this basis, a two-party line subscriber will be allowed twice as many calls as a four-party line subscriber. Five minutes will be considered a maximum for a single conversation on any party line.

The complaint adjuster will also handle routine business between central offices; the verification of data regarding cutoffs; complaints of busy reports which subscribers have reason to doubt; questions regarding overcharges or disputes with operators on pay station calls; reports from subscribers as to trouble on their line, etc. She will take charge of complaining subscribers who call for the manager, in the event of the latter being busy, giving them the necessary explanations and assurances.

Complaints from subscribers should always be handled on the assumption, that the subscriber's statements as to defective equipment or service are correct. This is necessary, not only as a matter of courtesy to the subscriber, but also to guard against a persistent recurrence of intermittent trouble. Cases of repeated complaints from the same subscriber should be referred to the manager, with recommendations for observing his service, so that same can be carefully watched until such time as the presence or absence of trouble is determined.

She shall verify the most important "Don't answer calls" or complete the connection if it is possible to do so. She shall be so located so as to be of easy access to the subscribers' catalogue, upon each card of which will be gathered data regarding the office hours of doctors, business houses, etc., so that she may be guided in *investigating complaints* of a *subscriber* who is unable to get the party he is calling. If it is discovered, and satisfactory explanation given, that telephone was not answered on account of no one being there, this will be ample assurance that there is no chronic condition in evidence on the line in question. If the card record shows that some one ought to be at the location of the party who is called, and subscriber calling insists that there is ome one there to answer the telephone, the adjuster will report to the trouble department, and as soon as such department reports findings, she will get in communication with the complaining subscriber and inform him of the circumstances of the case.

Her duties include the aiding of the chief operator, principally representing her at the desk, receiving complaints and calls for the chief operator. She shall endeavor, as far as possible, to maintain the established order of things in its entirety, conforming in all respects to the method and system pursued by the chief operator. She shall have charge of the desk monitors and information clerks, and see that the traffic through the desk is promptly and properly handled. In the event of any congestion she shall immediately call upon the chief operator for temporary relief, and be responsible to the chief operator for the entire desk service. While having no ex-officio jurisdiction over the operating force, she exercises control over them in the absence of the chief operator, as her representative.

FLOOR MONITORS.

The floor monitor has entire charge of the operators in her division, while they are on duty. She shall be responsible to the chief operator for the quality of the work performed by her division, while they are on duty, both in the case of individual operators, and considering the output of her particular squad in the aggregate.

It is her duty to keep complaints out of her division, to maintain as high a standard of service as possible at all times, and to superintend personally the work of each individual operator, coaching those who fall below the standard, reproving those who are careless or indifferent, and straightening out any little difficulties that may occur in the routine of their work.

She should keep all her operators under her observation, being continually on the alert for signs of trouble in any part of her division, and, if trouble should arise, she should cut in at once on tne position of the operator concerned, helping her to get the connection or aiding her in whatever manner the occasion may demand.

She should see that all subscribers' calls are answered as quickly as possible and that the disconnection signals are given prompt attention. She should take occasion at intervals when she has opportunity, to listen in on her different operators, in order to assure herself that they are doing their work efficiently and in conformity with the rules; and should maintain as perfect a degree of discipline as possible upon all occasions. She should deal personally with all petty infringement of rules or faults in operating, but in case of any serious trouble, or of marked insubordination on the part of any operator, should at once bring the matter to the attention of the chief operator for settlement. While her authority over her operators is more curtailed than that of the chief operator, it is within certain limits quite as absolute, and she is invariably upheld by the chief operator, within these limits, in dealing with the employees constituting her division. She should be thoroughly interested and enthusiastic over her work, or she will never be able to instill interest or enthusiasm into her operators. She should be self-reliant in order that her operators may feel confidence in her, and should not run to the chief operator for advice and assistance in every little difficulty, as by so doing she will be more of a hindrance than a help. She should rather show a proper spirit

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of independence and a capacity to form her own judgment, in a pinch, without falling back upon someone else in every emergency. Far from leaning upon the chief operator, the monitors should afford her such firm and reliable support that she can occupy her proper position in the organization, which she must inevitably forfeit if she is to spend her time in bearing up their weaknesses, a state of things that must of necessity detract from her potential strength. A monitor should, without being unnecessarily strict, still hold herself so far aloof from her operators as to be able to make her authority felt at the proper time. She should not call an operator by her given name nor permit operators to use hers. This also applies to the workmen. Too much familiarity between a monitor and her operators always tends to undermine discipline, and to lead to irregularities. A monitor who does not respect herself can never command the respect of her division. She should be diplomatically impartial towards all her operators, while contriving to impress upon each individual in her division, that she is her friend and will do all she can to help her. She should be painstaking and patient, as she will meet with many operators who will try these two qualities to the uttermost. Finally, while cultivating the art of seeing everything at once without appearing to do so, she should at the same time be discreet enough to occasionally be blind to some small irregularity. An operator whose soul is so vexed by being continually taken to task for minor faults, is apt to show her discouragement in the whole tone of her work, and the subscriber suffers accordingly.

She should be constantly on the alert for operators taking down connections improperly, releasing automatic ringing buttons, reporting the cord weights striking against the board, guarding against the plugging of lines, cautioning operators against speaking loudly or using improper expressions, seeing that operators hold cords until within a few inches of switchboard before allowing them to drop, and using every precaution to avoid unnecessary noise. She should also see that the operators sit in the proper position.

She should see to it that the operators' sets are so adjusted as to give the best results, and at times ask the operators of her division to ring on the test bell in the same manner that she would on a subscriber's line; will note the duration of the ring, the interval between rings and the time which elapses before the operator reports "They don't answer" on this test call. She should form her operators in line before the time for entering the switchboard room. She should see that the switchboard in her division is properly lighted and cause the lamps used for illuminating purposes to be turned off when there is no occasion for them. She should not be allowed to leave her division until she arranges with her supervisors for relief.

She should rarely, if ever, enter into conversation with other monitors in such manner, as to prevent her exercising continuous supervision of the service at her section of the board.

SENIOR OPERATORS.

The senior operators are a division which bears the same relation to the monitors that the assistant chief operator does to the chief operator. She represents her when she is on relief or absent, taking her place in charge of a division, as well as her authority, for the time being. At other times she handles a position in common with other operators, being amenable to the orders of her monitor, as they are. She should be, as a general rule, the most expert and experienced operator in a division, and it is in her care that student operators are placed when they have progressed sufficiently to allow them to operate slowly, and until such time as they are able to correctly handle positions by themselves, under the eye of a monitor.

INFORMATION CLERKS.

They shall give out numbers of subscribers who have been installed since the issue of the latest book, also changed numbers, disconnections, addresses, locations, etc. Anyone asking for a new subscriber's name which is not in the card record, and found to be in the latest book, will be asked whether or not he has a copy of such issue, so that a book can be forwarded to him. One of the latest books, corrected to date, will be maintained at her desk for the accommodation of those who, through some error, did not receive the latest book; also for the benefit of blind persons, parties calling from telephones which are located in dark places, etc. Information clerks should be very painstaking, courteous and exact in giving out information. Every possible precaution must be taken that parties have the right number.

Information clerks will not be permitted to hold arguments with the subscriber. If the subscriber desires to argue he should be immediately connected with the assistant chief operator. In connection with this, the same rules which apply to operators in pronouncing numbers in a clear and distinct tone will be observed by the information clerk. Calls on information lines will be answered "Information Clerk," and calls on monitored lines will be answered, "What number are you calling?" If the information clerk does not understand the name given, on answering one of the information lines, she shall ask calling party to spell same, also be sure in each case to get location of party whose number is wanted, before giving out information.

Where a party insists that record is incorrect, every effort must be made to determine whether or not such is the case.

EXCHANGE CLERK.

She is responsible for the central office records of every sort, and sees that they are kept up-to-date. She figures out the semi-monthly peg count returns, also the individual record of operators' standing, which is kept once a month, tabulates the files and test sheets, and keeps an accurate account of every line in the exchange district under its proper classification, whether it be a flat rate, measured rate, pay station line, etc.

She receives from the engineering department a copy of each subscriber's order, covering all new lines, changes and disconnects, and on receiving an O. K. of same from the wire chief, enters same in the proper records. She should see that a telephone number of a subscriber who has been cancelled, or has had number changed and old number appearing in latest directory, is not used for any other subscriber without being first passed upon by the exchange manager.

General Operating Rules

REPORTING FOR DUTY.—Operators shall report for duty punctually at the hours designated by the chief operator.

Absence.—Operators who are in any way prevented from reporting for duty shall see that the chief operator is given notice at least one-half hour before the time at which they should report.

Entering Operating Room.—At the first call bell in the operators' parlor, the operators shall go at once to the switchboard room, in the order of their positions at the switchboard. At the second bell the operators at work shall arise and pass around the left side to the rear of their chairs, while the operators coming on duty shall be seated from the right side of the chair, and im-

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mediately insert their receiver plugs. At the third bell the operators who are relieved shall pass out in an orderly manner.

Testing of Cords.—Before reporting on any "Don't answer" operator shall test the cord used by ringing on the test bell in operating room.

Leaving Position.—Operators shall not change or leave their positions without permission from the chief operator, except for regular relief.

Handling of Plugs and Cords.—Plugs must be put in and taken out by holding the body of the plug, and in no case shall they be pushed in with the flat of the hand, or taken down by pulling the cord. Operators shall make as little noise as possible in using apparatus; particularly when disconnecting, she shall hold plug until within a few inches of the board before letting it fall into its proper position.

Authorized Phrases.—Operators must confine themselves strictly to the phrases given in these rules, viz., "Number," "Line is busy," "I'll call them again," "They don't answer," etc.

Listening to Conversation.—In no case shall the operator listen on a subscriber's conversation more than is absolutely necessary to insure proper connection. On modern systems no listening whatever is necessary.

Proper Position.—She must sit in an upright position facing the board and must not look around or pay any attention to visitors or others.

Reporting of Trouble.—She must report promptly to monitor every instance of line or switchboard trouble coming to her notice.

Busy Service Line.—Operator must report promptly to monitor, every instance where all the lines of any department of the company are all busy.

Giving Out Time.—A uniform method shall be observed by the operator in giving out the time to subscribers. In the event of a party asking for the time at 10:45 a. m., the operator should reply thus, "Ten forty-five," and not a "quarter of eleven."

Parties Saying Bell Rang.—If, on answering a line signal, subscriber states that his bell rang, operator will reply, "I don't know who called you." If subscriber is not satisfied with this statement, and desires further explanation, operator will say, "I will connect you with the chief operator," and do so at once.

Switchboard.—Operators shall keep the keyboard in a neat and tidy condition; the use of water, confectionery, fruit, books, etc., while on duty is forbidden, and the switchboard must be kept free from everything not required by the service.

Conversation.—Operators shall not indulge in conversation with each other at the switchboard. Operators must be courteous in all their dealings with subscribers, but shall hold no conversation with them beyond that necessary in receiving calls and making connections. For any information or in case of difficulty, subscribers must be connected with the chief operator. Under no circumstances must an operator give her name to any person over the line.

Deportment.—The fact of an operator being on relief anywhere in the building, does not indicate that loud talking or boisterous conduct will be tolerated.

Operator's Set.—Each operator will be provided with an operator's set for her individual use, and will be responsible to the chief operator for its condition. When an operator is off duty the set shall be placed as provided by chief operator's standing order.

Order Wire.—In handling trunk connections by means of the order wire, operators must listen after connecting themselves with the calling circuit by pressing the proper button, and under no circumstances interrupt an order which is being given.

Secrecy of Telephonic Communication.—All employees are forbidden to disclose or discuss any communication between users of the telephone. The attention of operators is called to the fact that there is a legal penalty for infringement of this rule.

Use of Instrument.—Operators must speak in a low, clear and distinct tone of voice directly into the transmitter, which should be so adjusted that the lips shall not be more than one-half inch distant from it. The receiver must be retained at the ear continually while the operator is at the switchboard.

Answering Calls.—Operators must answer all calls promptly, using cords beginning with the first pair on the left of her position and continuing in order to the right side of the position. In replying to calls the operator shall use the single word, "Number," spoken with the rising inflection. The number given to operator, together with the exchange name, and letter, if any, shall be repeated to the calling subscriber sufficiently slowly to make it intelligible, and to give him a reasonable opportunity to make a correction. If the calling subscriber gives the number only, omitting the exchange name, she must not take it for granted that a local connection is wanted, but must, in every case, say "What exchange." In repeating back numbers operators should pronounce each figure of the number separately, thus: "Central, seven-two-two-seven-W," for Central 7227-W.

Should a subscriber give the exchange name and number only and the operator observe when she is about to insert plug in the multiple that the jack is marked (indicating that same is a party line) she will say to subscriber, "That is a party line, what letter?" If this is not clear to calling party, operator will say, "I'll connect you with the information clerk," which she will accordingly do. In the event of a party prefacing a number with the name of an exchange not connected with this company, the operator will say, "We have no such number, I'll connect you with the information clerk."

Busy Reports.—The answer, "Line busy," must be given to the subscriber calling only in the case of the called subscriber's line testing busy, and same shall be determined by the operator receiving a clicking sound in her telephone on tapping the rim of the jack of the number called for with the tip of her calling plug, or in the event of an outgoing trunk, the receiving of a busy back signal, indicated by the continuous flashing of the calling supervisory lamp. Care should be exercised on the former so as not to get out of order tone test (a shrill, humming sound) confused with the busy test. In no case must the report of "Line busy" be given for a trunk line, and in the event of all trunks to a branch exchange being engaged when a trunk connection is desired, the operator should report thus: "Crest lines are busy," "Lake lines are busy," or whatever the case may be.

When a line called for tests busy, and is enclosed with other jacks with a red line, the operator will test the remaining lines so enclosed and connect with one of them if possible, reporting "Lines are busy," only when all the series are in use. Except in the case of lines grouped as indicated in the above manner, operators shall not connect the subscriber with any other line than the one called for.

Out of Order Report.—The report "The line is out of order," shall be given in the same manner as set forth under heading of "Busy report," except that the operator will receive a shrill humming sound, when tapping on the rim of the jack of the number called with the tip of her calling plug, instead of the busy test click. The same instructions given under "Busy report" with reference to trunk and group lines will apply in the case of a line out of order.

Ringing.—If on tapping the rim of the jack of the number called for, a "busy" or "out of order" test is not received, the

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plug will be inserted in the jack, the listening cam closed and the called subscriber given one two-second ring.

Supervision.—If, after thirty seconds from the time the called party is rung, his supervisory signal remains lighted, showing that telephone has not been answered, she should throw her listening cam and say, "I'll call them again." The listening cam should then be closed, and the party called in manner heretofore set forth. In the event of the supervisory signal still remaining lit at the expiration of an additional thirty seconds, of one minute in all, the operator shall again ring in the manner heretofore prescribed, and if the subscriber has not answered thirty seconds after the second ring, or one and one-half minutes after first call was made, the operator shall report, "They don't answer," and should not ring again except at the subscriber's request.

If the supervisory signal of the subscriber who calls flashes before the called party answers, the operator will respond with "number," and if the party calls for the same number and expresses impatience on account of the party whom he has called not answering, the operator will say, "I'm calling them." If

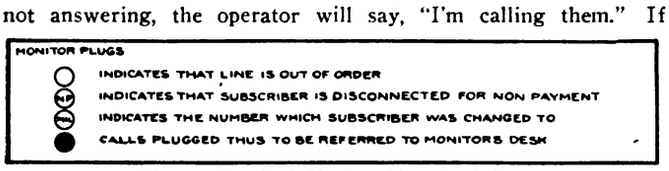

Fig. 1. Standard Monitor Plug Symbols.

the party who is calling hangs up the receiver before the party who is called answers, the operator will inform such called subscriber when he does answer, "The party who called you hung up their receiver," and if the party desires to know the number of the party who called, the operator will say, "I'll connect you with the chief operator." She will then change her cords so that the answering cord will be connected in the multiple with the party who was called and the calling cord with the chief operator. The operator will immediately inform the chief operator the line number of the party who called. In no case must the operator give out such information, as the person who called may be on a party line, and the party who would be given such number would, on calling same, invariably get the wrong party. The chief operator, however, after referring to subscriber's list, will give the party the information desired, unless the person who called happened to be a party line subscriber. Even in this case the chief operator will inform inquiring party the name of the different subscribers on the line, to enable him to select the one who would be most likely to call him.

In the event of the called party's supervisory signal flashing, with the other signal lit showing that the party who called had hung up receiver, and party who was called requested a number, operator will say, "Give this operator your number," and will immediately take down the connection, allowing line lamp to appear opposite the operator who generally answers his call. When both supervisory signals come in, the operator should immediately take down the connection. The time required to disconnect should not, on the average, exceed the time required to answer the line signal.

In supervising an outgoing trunk call the operator on reporting to subscriber, "I'll call them again," will immediately switch on the order wire of the desired branch operator and request her to ring again on the number of the trunk which is being used, but where the equipment permits, the originating "A" operator will be held responsible for the supervision and ringing of outgoing trunk connections.

By strictly complying with the above, subscribers who have been cut off during their conversation can, in most cases, be again connected. An operator who learns from a subscriber that he has been cut off shall endeavor at once to restore the connection. In the event of her being unable to do so, she shall immediately connect complaining party with the assistant chief operator.

In all cases where a subscriber is connected with the chief operator, manager, etc. operator should switch in in advance and give her superior the facts in the case in as few words as possible, so that they can talk intelligently and without making it necessary for the subscriber to repeat story.

In order that operators may have some means during the busy hour of knowing when to switch in on a connection and say, "I'll call them again," and also, that they may determine when sufficient time has elapsed to report "They don't answer," the following rule on the handling of cords will be observed.

In a former rule headed *"Answering calls,"* you are instructed to use the cords in order as they come, beginning at the left hand side and continuing to the extreme right. Granting that in a busy hour about four connections are put up per minute, an operator can readily determine, by the number of cords up, just how long the supervisory signal of the party whom she is calling remains lighted. Such signal therefore remaining lighted on the second pair of cords to the left of the pair she is about to use,

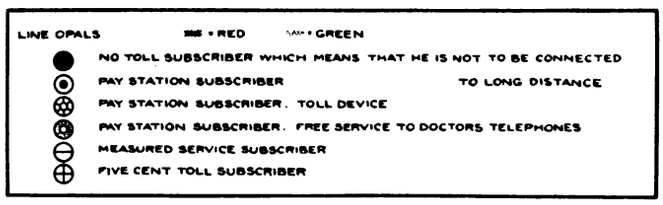

Fig. 2. Standard Line Lamp Cap Symbols.

will indicate to her that thirty seconds have elapsed since the called party was rung, and she will proceed to ring them again. If the lamp still burns on the fourth pair of cords to the left of the pair she is about to use, it will be further indications to her that the sixty seconds are up, and she will ring the party again in the manner provided for in rules for ringing. In case of the calling supervisory signal remaining lighted on the sixth pair of cords to the left of the pair she is about to use, it will be indication to her that one and one-half minutes have elapsed and she shall report, "They don't answer."

In other than the busy hour, operators will have more of an opportunity to determine when these different periods have elapsed, and will, therefore, at such times, not be guided by this plan. However, the using of the cords in regular order will be maintained at all hours, as a more even wear on the cords is secured thereby.

Team Work.—All operators are required to assist one another, both in answering line signals and disconnecting, and in no case shall they be allowed to confine themselves to the answering of calls from lines terminating directly before them. Operators are therefore obligated to answer the first line signal operated in their vicinity.

In order to obtain the best possible team work among the operators it should be thoroughly understood that under no circumstances will any operator be allowed to plug out a line signal until she is able to answer the same as soon as plug is inserted.

Emergency Calls.—Any one calling for the fire department will be connected with ————, even if this line tests busy, in which case the operator must not ring on the line. This rule will only apply to the fire department line.

Parties calling for the police department will be connected with ————.

Parties calling for a certain firm's ambulance will not be held

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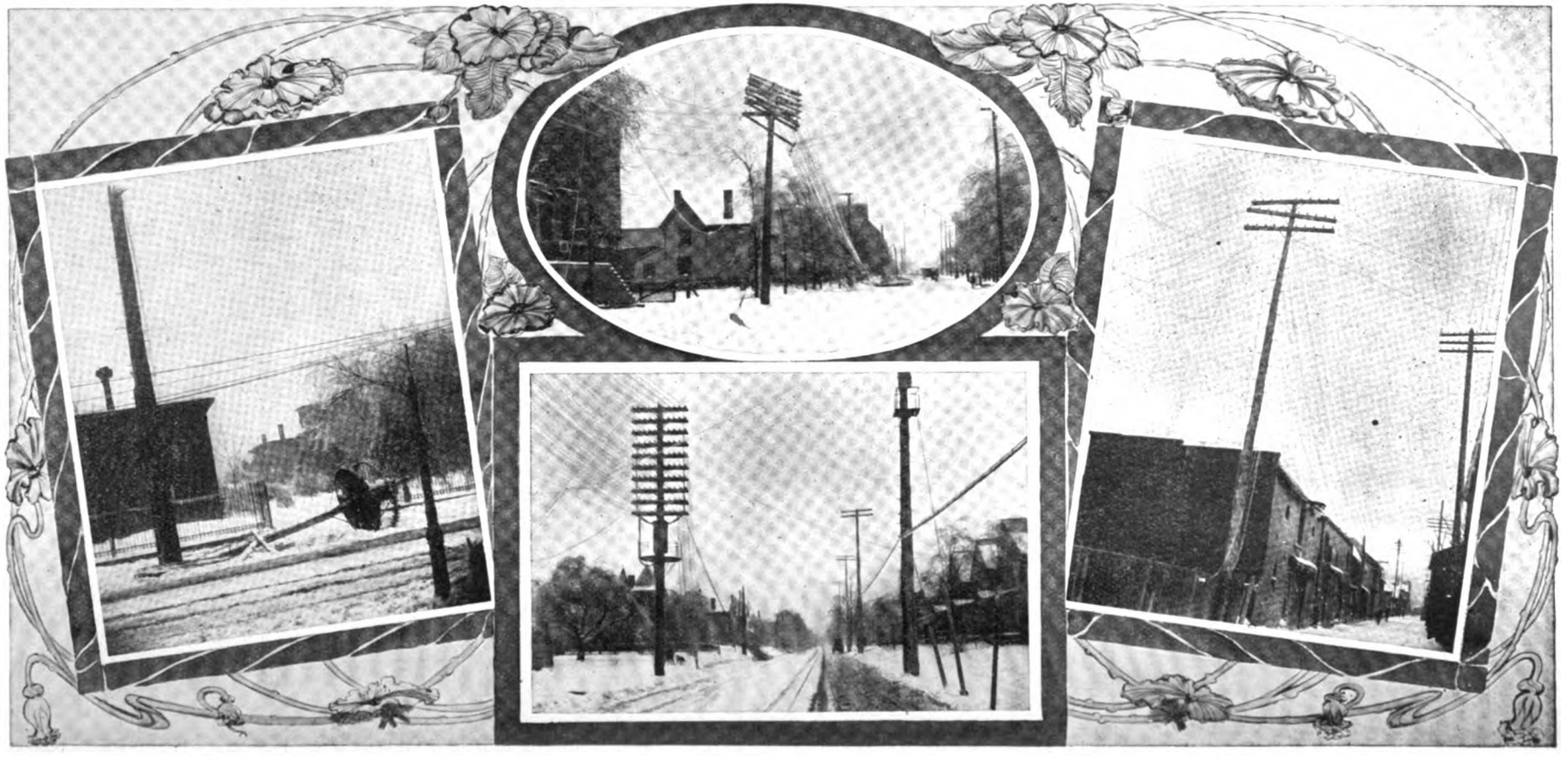
LE ROY W. STANTON ELECTRIC BUILDING
CLEVELAND, OHIO
Consulting and Constructing Telephone Engineer
1644 Monadnock Building, Chicago, Illinois

Views of the Fearful Havoc of a Sleet Storm

Terrible Devastation by Nature's Elements, Tens of Thousands of Dollars' Worth of Property Destroyed in a brief space of Time

DIVIDENDS WIPED OUT FOR YEARS TO COME

Why not use **The Stanton Open Wireless or All-Cable System,** which is immune from sleet storms? When properly planned and constructed it is cheaper in first cost, far cheaper to maintain, enables you to give better service, costs less for depreciation, and insures greater and regular dividends.



POLES BROKEN AND WIRES DOWN AS FAR AS THE EYE CAN SEE.

Insure your properties against heavy loss by having **L. W. Stanton, the Consulting and Constructing Telephone Engineer, of Cleveland and Chicago,** place your wires under ground, in accordance with the latest and most approved engineering practice.

Please mention THE AMERICAN TELEPHONE JOURNAL when writing to ADVERTISERS.

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National-Interstate Operating Rules

(Continued)

up for the number, but operator will inquire of the monitor, who can furnish her with such information at once.

"B" or Trunk Operators.—"B" operators shall, in addition to the regular operating rules, observe the following: She shall not preface the number of any trunk which she assigns with the word "on" or "put them on," or use any term whatsoever with the number of the trunk she assigns.

She shall, in assigning the number of a trunk, repeat each figure separately, thus: "Four-one."

If she does not understand the "A" operator asking for assignment, she will not assign the trunk, and her silence will be indication to the "A" operator that her request is not clear, and the assignment will be asked for again.

The monitor should be advised of any "A" operator, or the "A" operators of any particular exchange who insist on breaking in on the order wire without first listening to determine whether it is in use, or any interference which would result in the confusion or the delay of an assignment.

On incoming ring-down trunks the "B" operator will answer by giving the name of her exchange.

Monitors must immediately be notified in each case where an assignment has not been taken, also where subscribers are put on a different trunk from that assigned or put upon a trunk without any previous request for an assignment. In the event of the operator discovering, after she has given out an assignment, that the "A" operator is calling for the wrong number, or the line which is called for is out of order (assuming that "B" operator has no listening in keys at her position), she will plug the trunk assigned in on a special jack which is connected with her set and get information necessary from subscribers to enable her to complete connection. In the event of her finding a line busy after assigning a trunk, she shall connect such trunk to one of the busy back jacks.

All trunks will be assigned at the incoming end only.

In asking for an assignment for a through trunk, say from Crest to Broad, for telephone number Broad 777 "A" operator will give out the call to central thus: "Crest-Broad 200." "B" operators after giving an assignment will not ring party called for until subscriber's signal shows that "A" operator has put calling party on trunk assigned.

Pay Station Operators.—In addition to the ordinary operating rules, the pay station operators will observe the following: She shall see that the proper amount is collected from each party as soon as calling supervisory lamp goes out, and before she completes the connection. The phrase used in collecting on local pay stations will be "Drop nickel," or "Drop dime," as the case may be.

She shall, regardless as to who the calling party may be, allow only such free connections to number specified as are shown on her list of dead-head calls, and will be governed by similar list posted at her position of doctors' telephone numbers, to which free calls are allowed from certain pay stations only.

Should she, in the course of her duties, notice or secure information which would lead her to believe that the code words, or any of the other privileges incident to pay stations, are being abused, she shall report same to her monitor promptly. In the case of a subscriber calling for a line which is busy, operators should, after reporting "Line busy," inform subscriber that she will call him as soon as line is disengaged, and after making note of the calling and the called number on a slip provided for that purpose, she will occasionally test the number desired and make connections as soon as it is possible for her to do so. This rule will only apply to pay station subscribers.

Operator must give special attention to calls from pay stations, as they, being public telephones and frequently used by persons not familiar with their use, every effort must be made to aid such inexperienced customers in obtaining satisfactory connections.

Measured Service Operators.—Will be governed by the same rule as pay station operators, except that the phrase, "Register," will be used instead of "Drop nickel."

Switchboard Symbols.—The switchboard signals, as designated (Figs. 1, 2 and 3), need very little explanation, except that the pay station toll device symbol is had by merely putting a protected opal over the lamp.

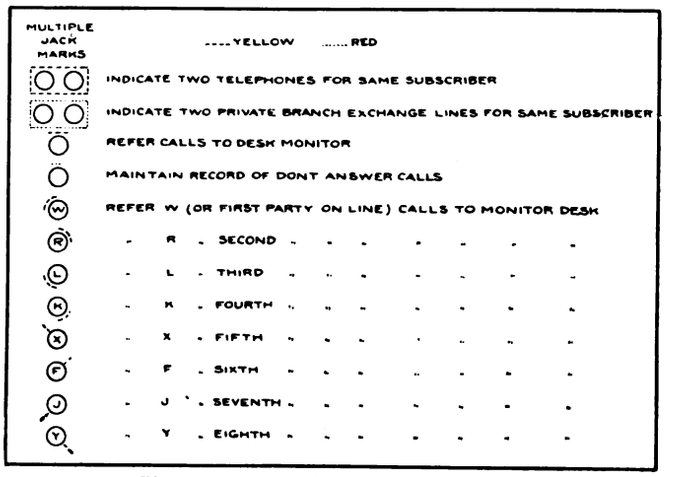

Fig. 3. Standard Multiple Jack Symbols.

In small exchanges where an out of order tone test is not in use, a white plug should be used, which would be indication to the operator that the line is out of order. Also, where exchange is not large enough to warrant a desk monitor, a list will be posted on the board, and where instructions call for operator to refer call to monitor, operator will refer to list and give out information desired.

A yellow mark enclosing two or more multiple jacks will indicate that if the first line is busy, don't answer, or out of order, the second, third, etc., will be called in the order named. A red mark enclosing a number of lines will be handled the same as those enclosed in yellow, except that such lines enclosed in red are private branch exchange trunk lines and must not be rung when connection is first put up. If, however, at the end of thirty seconds, such P. B. X. calls have not been answered, operator will say "I'll call them again," and will then ring in the usual manner. A yellow mark over an individual line multiple jack indicates that subscriber is being called by mistake, or otherwise annoyed, and all calls will be referred to monitor desk or list, as the case may be to determine the correctness of the call before same is made. A red mark over an individual multiple jack indicates that subscriber is having some trouble in getting his calls, and all don't answers on such lines should be immediately reported to the manager. On party lines where the number has been changed, telephone taken out, or is monitored for any other reason, calls for such numbers should be referred to the monitor desk, or switchboard list, and will be designated as follows: A yellow mark representing a quarter circle on the upper left hand corner of the multiple jack indicates the first party on the circuit, etc. In magneto exchanges the same symbol as is used on line opals will be painted on the subscribers' drop, so that such symbols will plainly be seen when drop falls.

In case one or both cords of a pair become out of order a small rubber ring (a number of which should be located at each position) will be placed around the plug until such cord has been repaired.

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MONARCH ELECTRIC & WIRE CO.

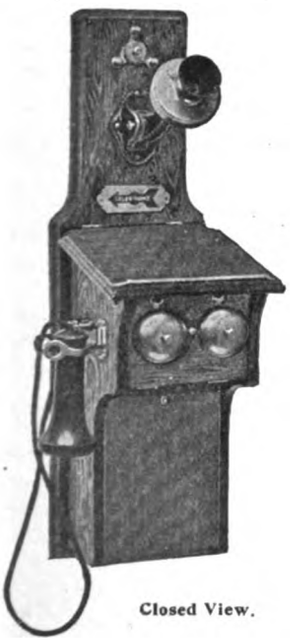
125-127 SO. CLINTON STREET, CHICAGO, ILL.

Send your orders for your requirements to us and receive the benefit of a large and complete stock of all kinds of telephone construction material, assuring prompt shipments at the lowest possible prices.

We manufacture Galvanized Strand and Weatherproof Line Wire

GET IN LINE ON UP TO DATE APPARATUS

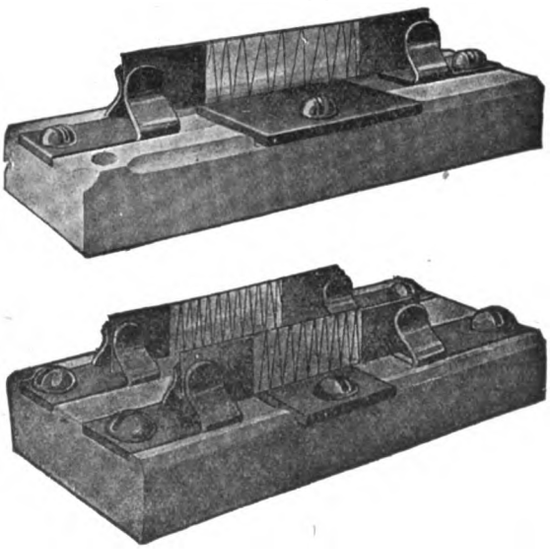
If you order Central "Leader Junior" Telephones you will be buying now what you are sure to buy ten years from to-day.

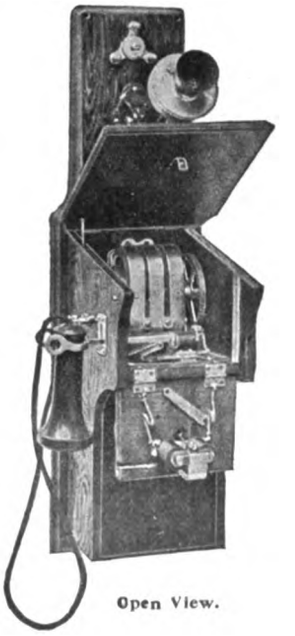


Closed View.

CENTRAL FUSE BLOCK

LIGHTNING ARRESTERS





Open View.

Sample Series—4 Bar or 5 Bar Bridging Leader Junior Telephone shipped to any responsible party in the United States on 30 days' trial prepaid freight.

Sample Fuse Block as above sent free on request to any one mentioning this ad.

CENTRAL TELEPHONE & ELECTRIC CO.

2135 Lucas Ave., St. Louis, U. S. A.

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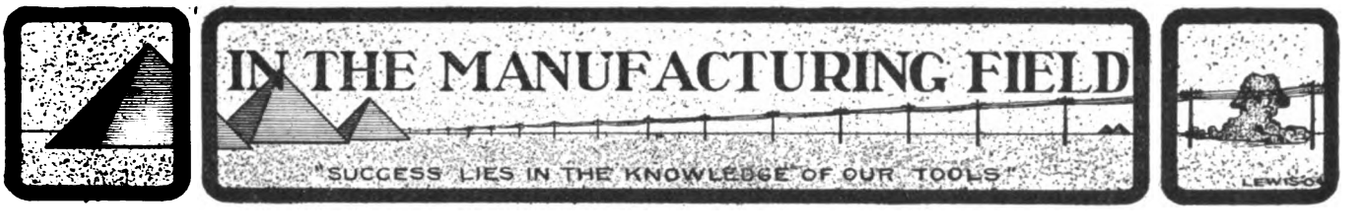

MANUFACTURERS' EXHIBIT.

AS explained on the first page of this issue, the description of Manufacturers' Exhibits at the National Interstate Convention in Chicago, after passing through wreck and fire in the Twentieth Century catastrophe, finally reached our hands. The matter contained so much that is interesting that we feel it only justice to our readers to print it this week.

NOT in years has there been such a large display of telephone apparatus incidental to the conventions. The sixth floor of the Auditorium Hotel was given up largely to the exhibits and the display overflowed to the fifth floor; then to the parlor floor, and one enterprising manufacturer occupied a conspicuous position adjoining the lobby. Many of the rooms were decorated with flowers and plants, some of them being positively beautiful with the floral display. Electric signs ran riot, and electricity and telephones were very much in evidence everywhere. Among those who had exhibits were the following:

THE ACKERMAN-BOLAND TELEPHONE CO., Springfield, Ohio, and Chicago—Intercommunicating telephones.

THE ADDRESSOGRAPH COMPANY, Chicago, was represented by C. Worthington, Mr. Welford and J. B. Hall.

THE AMERICAN CLOCK COMPANY, Chicago, manufacturers of all kinds of time clocks; G. F. Randall and G. J. M. Porter were in charge. This company manufactures an electric synchronizing system for clocks adapted to operate on telephone lines.

THE AMERICAN CONDUIT COMPANY, Chicago, was represented by A. L. Waterbury, and displayed a full line of fibre conduit.

THE AMERICAN ELECTRIC FUSE COMPANY, Chicago, in its exhibit made a special display of the Kaisling switchboard protectors. The company was represented by the president, Frank G. Jones, Secretary J. A. Kenney, Geo. W. Rodomer and H. S. Bonney.

THE AMERICAN ELECTRIC SUPPLY COMPANY, Chicago, showed a good line of telephones and supplies in charge of E. J. Johnson and F. D. Phillips.

THE AMERICAN ELECTRIC TELEPHONE COMPANY, Chicago, had a fine exhibit in charge of P. C. Burns, J. G. Ihmsen and the following salesmen: M. W. Zabel, John Reid, T. H. Ewing, George B. Roberts, P. J. Eubank, J. C. Henderson, W. R. Haupman and H. P. Blackledge.

THE AMERICAN STEEL AND WIRE COMPANY occupied two rooms with its exhibit. W. Bogne, Geo. Long, C. A. Warner, M. McCleod, Burnley Boyers, Chas. Knight and M. Merriman were in charge.

THE ARMOUR INSTITUTE OF TECHNOLOGY, Chicago, was represented by G. W. Wilder.

M. B. AUSTIN & COMPANY were represented by M. Austin, W. A. Brown, A. H. Friend, A. Meinema and R. J. Thorne. Their specialty was the Meinema selective ringing lockout system, safety wires and cables, and the National Wire Corporation products.

THE AUTOMATIC ELECTRIC COMPANY, Chicago, represented by J. F. Crook, H. H. Woodworth, A. J. Rousseau, C. L. Fisher, H. S. Durant and A. E. Skalowsky. It showed a complete automatic exchange of the 10,000 type and a four-party selective ringing non-interfering system in operation.

THE BAIRD MANUFACTURING COMPANY, Chicago, was represented by Edward P. Baird, O. C. Dennis, N. E. Norstrom and H. V. Obsfelder. Telephone pay stations, call registers and telephone time stamps were shown. A specialty was made of secret service telephones, bridging telephones and telephone transmitter arms.

J. W. BARR, Cleveland, manufacturer of transmitter arms, was in attendance.

I. A. BENNET, Chicago, manufacturer's agent, had a display of insulated telephone wires, cables, Bull Tongue Anchors and general telephone supplies.

THE F. BISSELL COMPANY, TOLEDO, OHIO—A full line of telephone supplies, including Security potheads, cable boxes, marline hangers, cable trolleys, and conduit rods. The company is making a great hit by furnishing correspondents with cable charts free of cost. Frederick Bissell, W. S. Bissell, C. M. Hamilton, Frank Knierein, J. A. Navarre and M. S. Walker were in charge. This firm showed the National Conduit and Cable Company's line of paper insulated cable.

THE CENTRAL TELEPHONE & ELECTRIC COMPANY, St. Louis, in charge of James S. Cuming, Nelson Cuming and George F. Poertner. The company showed as special features a line of protectors and junior type telephones.

THE CENTURY TELEPHONE CONSTRUCTION COMPANY, Buffalo, had a very attractive exhibit, decorated with flowers and palms. Bert G. Hubbell, president; G. F. C. Bauer, sales manager; W. W. Kidney, chief engineer; Lloyd D. Knapp, western representative and Harry S. Grant, Indiana representative, were in charge. The company showed a simple four-party selective system for either local or central energy, platinum electrode transmitters, new compact cable heads, automatic signalling instruments for magneto work, etc.

THE CHICAGO TELEPHONE SUPPLY COMPANY, as usual, had a large exhibit. Its new lamp board which is to be shipped to Nome, Alaska, attracted general attention in the lobby. The company were represented by George A. Briggs, A. J. Briggs, G. W. Brown, J. E. Meyers, H. C. Randall, John J. Browning and E. J. Kerstetter.

THE CHICAGO WRITING MACHINE COMPANY, Chicago, showed a line of adjustaphones and telephone holders. J. E. Baumrucker was in charge.

GEORGE W. CONOVER, manufacturer's purchasing and forwarding agent, Chicago, Ill., displayed Gray telephone pay stations and Equipoise Telephone Holders. George W. Conover, T. P. Hayes and Harry S. Conover were in charge.

FRANK B. COOK, Chicago, showed terminal heads, fuses, protective apparatus, pole cable terminals and construction material. A specialty was made of No. 8 self-soldering protector. The firm was represented by Mr. Cook, F. W. Pardee, general manager; F. R. Parker, G. C. Fricke, James Strasburg, M. A. Gurney, C. C. Newburn, F. A. Rader and H. R. Cook.

A. J. COX & COMPANY, Chicago, represented Croselmire & Ackor Co., of Newark, N. J.; Delaware Hard Fibre Company, Wilmington, Del.; General Insulate and Machine Company, of Brooklyn, and the Riverside Metal Company. Mr. Cox was in charge.

W. H. CRUMB & COMPANY, Chicago, engineers and contractors, were represented by W. H. Crumb and D. Crumb.

THE DEAN ELECTRIC COMPANY, Elyria, Ohio, showed a section of the Niagara Falls multiple switchboard in operation, with four-party selective ringing equipment. An eight-party system

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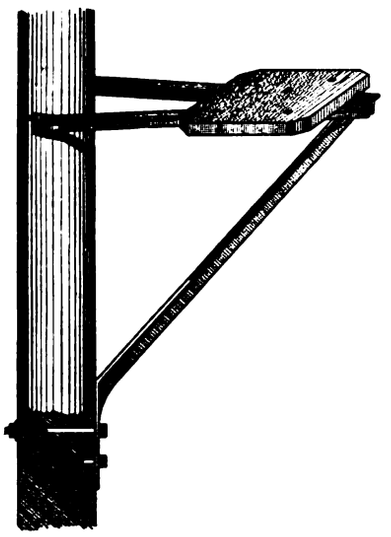
We can save you at least 10% on LINE CONSTRUCTION MATERIAL



no matter where you are buying now.

If such a saving is worth your while, write us for quotations.

Pole Seat

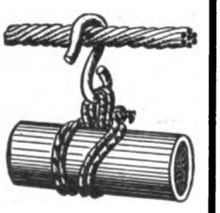
Cone Point Lag Screw

Gimlet Point Lag Screw

Fetter Drive Pole Step

Fetter Drive Screw

Cross Arm Brace Complete



Marlin Cable Hanger

Square Washer

Through Bolt

Guy Rod

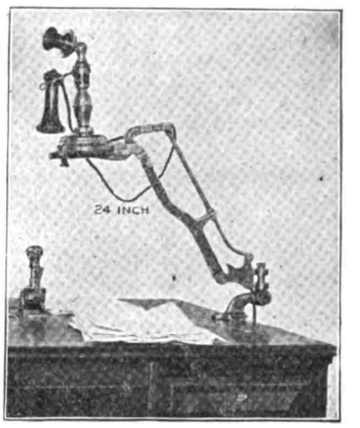
Wire Rope Thimble

Write for Free Estimate Blank

SCHAPER CONSTRUCTION MATERIAL CO.,

Electrical Exchange Building, New York City.

According to the Superintendent of Maintenance of one of the largest telephone companies in the world, "60 per cent of telephone troubles are caused by the kinking and tangling of the surplus cord."



The Equipoise Telephone Holder

prevents this kinking, keeps the telephone in perfect order and is so convenient that it encourages the use of extension sets.

Fastens to desk, table, wall, floor—anywhere. Swings around in a 4-inch radius to any position and adjusts itself to any height. As invaluable in homes as in business offices.

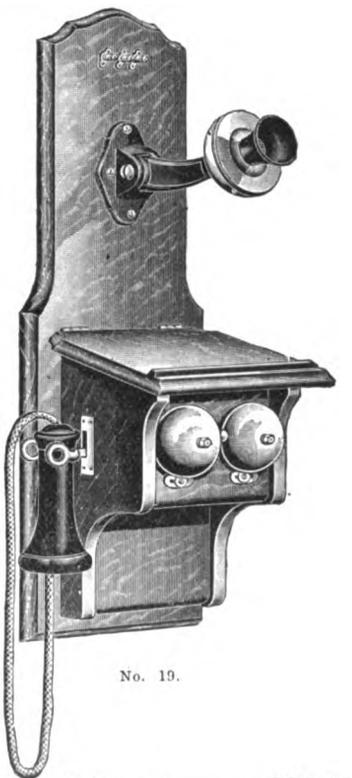
Five different sizes—18, 24, 30, 36 and 42 inches.

Adapted to hold two different telephones on one pivot

Write for booklet and *special terms* to telephone men and electrical supply houses.

Oliver Mfg. Co.,

1014 Drexel Bldg., Philadelphia.



No. 19.

"Conn." Common Battery Phones are THE STANDARD EVERYWHERE. Largest and Finest Equipped Telephone Plant in the East.

CONN. TELEPHONE & ELEC. CO., MERIDEN, CONN., U. S. A.

Send for Large Catalog.

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was also shown; also the new express type switchboard and a complete line of telephones and parts. A. E. Barker, general manager; Ray H. Manson, assistant engineer; Fred. E. Freers, Illinois salesman; L. E. Hamilton, chief draftsman, and William F. Scott, salesman, were present.

THE DENIO GENERAL ELECTRIC COMPANY, Rochester, N. Y., showed a fire alarm system adapted for telephone lines, and other electric signal apparatus. The company was represented by Garrison Babcock, consulting engineer, and John A. Nolan. The novel advertising feature of this company was a jumping sign suspended over the door of its exhibit.

THE EDWARDS-HINE COMPANY, Grand Rapids, Michigan, represented by Charles C. Wilmot, H. G. Bedford and E. H. Edwards. This company has made a special study of telephone accounting and had an attractive display of record and accounting blanks.

THE ELECTRICAL APPLIANCE COMPANY, Chicago, had an exhibit of the famous Eaco telephones, telephone supplies and 1900 batteries, in charge of H. N. Remington and S. A. Dinsmore. This firm treated the delegates to a delightful surprise in the form of a trip to the White City, the Coney Island of Chicago. A special performance of "Fighting the Flames" was given, in which the "ad" of the Electric Appliance Company was conspicuous upon the burning buildings. The wagons of the firm were also impressed into service and were driven along the street in front of the buildings which later took fire.

THE ELECTRIC GAS LIGHTING COMPANY, Boston, in addition to an attractive display, used a huge graphaphone for advertising purposes. J. Allen Haines, the Chicago manager, was in charge, assisted by E. Boardman of Boston, electrician.

THE EUREKA ELECTRIC COMPANY, Genoa, Ill., was represented by R. S. Mitten, J. S. Whittaker, H. W. Foote and G. H. Pierce. It showed a line of telephones and switchboards and made a display of a self-restoring drop bridging instrument and its famous Carter test set and intercommunicating telephones.

THE EVERSTICK ANCHOR COMPANY, Quincy, Ill., displayed samples of the Everstick Anchor.

THE EWING-MERKLE ELECTRIC COMPANY, St. Louis, was represented by L. G. LeBourveau. This company showed, among other things, a new switchboard with many novel features, the most striking of which was a scheme for combining the drops and jacks.

THE FAHNESTOCK TRANSMITTER COMPANY, Brooklyn, N. Y., distributed cards showing its spring binding post.

THE FARR TELEPHONE CONSTRUCTION AND SUPPLY COMPANY, Chicago, showed, among other things, the Watkins selective ringer and lockout system. Charles W. Farr and E. W. Hurst were in charge.

THE FIBRE CONDUIT COMPANY, Orangeburg, N. Y., exhibit was in charge of the western manager, W. H. Smythe, Jr.

THE FISK-NEWHALL TELEPHONE MANUFACTURING COMPANY, Chicago, showed a special generator whose output it claimed to be thirty per cent. greater than any other generator on the market. H. M. Fisk and S. F. Newhill were in charge.

THE GLOBE AUTOMATIC TELEPHONE COMPANY, Chicago, was represented by F. A. Lundquist.

THE GREEN ELECTRIC AND TELEPHONE COMPANY, Milwaukee, was represented by John J. Leidich.

THE HALLER MACHINE COMPANY, Chicago, makers of all kinds of electric signs, had one of the most conspicuous flashlight signs at the convention.

THE HOLTZER-CABOT ELECTRIC COMPANY, Brookline, Mass., was represented by its western manager, E. R. Harding.

THE ILLINOIS ELECTRIC COMPANY, Chicago, showed a general line of supplies and construction material. Those representing the company were F. E. Healy, T. K. Cushing, Carl Keith, N. G. Harvey, E. A. Quarfot, C. J. Fitscher and George H. Porter.

THE INTERNATIONAL TELEPHONE MANUFACTURING COMPANY, Chicago, was represented by Henry Shafer, president; W. E. McCormick, vice-president; F. L. Middleton, sales manager; J. C. Murray, H. H. Davenport and M. C. Insley, sales agents. The exhibit showed all the working parts of a complete line of equipment for any size exchange, including multiple switchboard apparatus and its "growing" exchange system.

LINDSLEY BROTHERS COMPANY, Chicago, a large producer of telephone and telegraph poles, was represented by George L. Lindsley.

THE MALTHANER ELECTRIC MANUFACTURING COMPANY, Minneapolis, showed a line of automatic generators.

THE MANUFACTURERS DISTRIBUTING COMPANY, Cleveland, Ohio, showed the Skellyphone holder, with M. M. Wheelock in charge.

W. N. MATTHEWS & BRO., St. Louis, displayed the Stombaugh guy anchor. Claude Matthews was in charge.

THE MEYERCORD COMPANY, Chicago, displayed Decalcomania transfers, permanent opalescent window signs and wood panel signs. B. J. Stovel, L. J. Carey and G. R. Meyercord were in charge.

THE MILLER ANCHOR COMPANY, Norwalk, Ohio, in charge of G. H. Miller and F. B. Miller. A miniature Miller anchor was given to every delegate.

THE MONARCH ELECTRIC AND WIRE COMPANY, Chicago, showed a line of weather-proof, wire strand, telephone wires and cables. The company was represented by E. W. Kearns, A. D. Gillespie, C. A. Kuhlman, Lewis Schwab, Henry Schwab and Samuel Mankowitz, who royally entertained all visitors with open house.

THE MONARCH TELEPHONE MANUFACTURING COMPANY, Chicago, had an extensive exhibit of large and small magneto boards and toll boards which it demonstrated. The rooms were prettily decorated with cut flowers and potted plants. In charge were E. E. Yaxley, treasurer and general manager; A. J. Carter, Iowa; T. O. Dunlap, Missouri and Kansas; R. O. Stone, Indiana; W. H. Trimm, sales manager; J. C. Hubacher, secretary.

THE MOON MANUFACTURING COMPANY, Chicago, represented by H. E. Procunier, president, and F. H. Wood, sales manager, displayed cable appliances for distributing cable and tapping out cable wires with fuse and carbon protection for all cable plants, eliminating sleeve splices and wipe joints.

THE MORGAN & WRIGHT COMPANY, Chicago, showed a complete line of insulating tape. E. S. Hilton was in charge.

THE W. G. NAGEL ELECTRIC COMPANY, Toledo, was represented by W. G. Nagel, the president of the company.

THE NATIONAL BATTERY COMPANY, Buffalo, was represented by Bertram Smith, western sales agent.

THE NICHOLAS SELECTOR TELEPHONE COMPANY, Rochester, N. Y., was represented by C. E. Nicholas. This apparatus was shown in connection with ten different prominent manufacturers' telephones.

THE NORTH ELECTRIC COMPANY, Cleveland, Ohio, had commodious quarters, decorated with flowers and potted plants. A full line of telephones and switchboards was shown. C. H. North was present; also I. J. Kusel, general western sales manager; David Gibson, advertising manager; C. D. Boyd, Indiana representative, and George D. Pratt, eastern representative.

THE PEARNE-KRUM COMPANY, Chicago, showed the Pearne flashlight telephone transfer system.

THE PEIRCE SPECIALTY COMPANY, Chicago, was represented by Mr. Peirce. The company showed the Peirce test connector made in brass for copper wires and in aluminum for iron, or iron and copper.

LOUIS M. PIGNOLET, New York, distributed reading matter relative to his special volt-ammeters for telephone testing.

RABER & WATSON, Chicago, showed a miniature pole yard with

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Cedar Poles

in stock

We have the following poles on our skids, ready for immediate shipment:

3,000—8″ 25′	4,000—7″ 40′	1,200—8″ 55′
2,500—7″ 30′	3,500—8″ 40′	500—8″ 60′
2,000—7″ 35′	2,000—7″ 45′	100—8″ 65′
2,000—8″ 30′	2,000—8″ 45′	and longer.
	2,200—8″ 50′	

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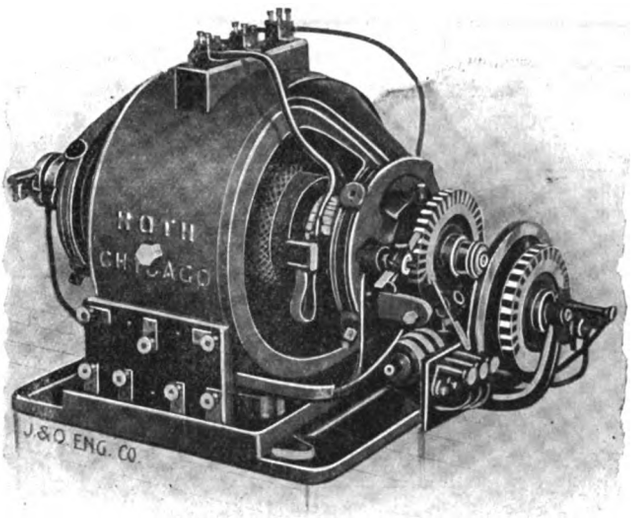

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in using our Six-Bar 'Phone. Will ring through heavy grounds and leaks on the line when other generators would not ring a single bell. Our prices are right. Send us a trial order. 'Phones and Line Supplies.

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a loaded train in full operation. Tom Brockman, the negro of phenomenal height, acted as a moving sign. Brockman is 7 feet 8 inches in height and looks like an animated pole.

THE ROCK ISLAND BATTERY COMPANY, Rock Island, Ill., made a special exhibition of dry cells claimed to be the longest lived dry cells known to the trade. The company was represented by M. A. Loeb and Louis Loeb.

THE STANDARD TELEPHONE AND ELECTRIC COMPANY, Milwaukee, was represented by H. M. Eldred.

THE STANDARD UUDERGROUND CABLE COMPANY, Pittsburg, was represented by J. R. Wiley, western sales manager, Chicago, Ill.; T. E. Hughes, southeastern sales manager, Philadelphia, Pa.; E. J. Pietzcker, southwestern sales manager, St. Louis, Mo.; W. M. Rogers, Chicago, Ill., and J. E. O'Neill, Chicago, Ill.

THE STERLING ELECTRIC COMPANY, Lafayette, Ind., had perhaps the most complete exhibit shown during the convention. The large reading room at the north end of the office lobby was vacated for the use of this concern. In the display was a section of a 3,000 line multiple switchboard, sold to Jones & Winter, contractors, Chicago, for Green Bay, Wis.; a 2,000 capacity distributing rack and protection, sold to one of the largest foreign telephone exchanges; 100 drop section of new style standard Bell type magnet board, sold to National Telephone and Electric Company, Clinton, Ill.; private branch exchange switchboard, sold to Peru National Bank, of Lima, Peru, South America; lamp signal magneto switchboard, sold to Seymour Home Telephone Company, Seymour, Ind.; chief operator's and monitor's desk, sold to Jones & Winter for DePere, Wis.; also four-party line magneto telephones and four-party line common battery apparatus in operation. Besides the above a complete line of telephones and protective apparatus was shown. The room was beautifully decorated with flowers and palms and a handsome electric sign attracted all comers. The company was represented by W. E. Doolittle, president; W. R. Coffroth, secretary and treasurer; S. B. Fowler, engineer; H. Doolittle, purchasing agent; Evan S. Shelby, general sales manager; George Metcalf, E. C. Clay and H. W. Mower, salesmen.

THE STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY, Rochester, N. Y., had a large exhibit of its well known goods. Those representing the company were C. W. Stiger, general sales manager; J. B. Cracraft, general manager in Chicago; A. O. Stigburg, shop superintendent; E. A. Reinke, sales engineer, Chicago; E. P. Shafer, Indiana representative; J. G. Gould, western sales manager; Messrs. Bowen, of Des Moines, Iowa; P. Meyers and C. Lewis, of Illinois, salesmen.

THE SWEDISH-AMERICAN TELEPHONE COMPANY, Chicago, had an unusually fine exhibit. This energetic concern occupied the entire south parlor, which had been very attractively decorated with palms, cut flowers and potted plants for the occasion. In these spacious quarters the company showed a full line of its well known goods. Two special exhibition novelties attracted general attention. One was a metal telephone cabinet; the other was a cabinet of plate glass, ornately cut, the first of the kind ever shown. It was a very handsome affair. There was an air of general up-to-dateness about the whole exhibit, including an electric automobile in which President E. B. Overshiner visited various parts of the room. Others representing the company were A. V. Overshiner, C. H. Mackin, J. A. Russell and F. E. Seeley.

One of the greatest hits of the convention and one of the things that caused a most favorable comment was the souvenir distributed by the Swedish American Telephone Company. It consisted of an artistic watch fob, designed to represent the well known trade mark, of this company. It was made of gold in medallion shape and the trade mark, enamelled in four colors, hung from a black silk ribbon. The demand for these fine souvenirs far exceeded the supply, several hundred of them being given out.

THE T AND A SELECTIVE CALL COMPANY, Geneseo, Ill., was represented by E. A. Terpening. A specialty was made of a selective relay for lines, responding only to direct currents.

THE TORNQUIST ELECTRICAL MANUFACTURING COMPANY, Clinton, Iowa, was represented by J. A. Tornquist.

THE VOUGHT-BERGER COMPANY, La Crosse, Wisconsin, manufacturers of telephones and switchboards, showed a general line of its goods and made a specialty of the celebrated pendant telephone and two ball adjuster. A raffle of a cabinet desk was an additional attraction. C. D. Enochs, John G. Ball and M. I. Berger were in charge.

THE WATERBURY COMPANY, of New York.—This firm's exhibit of lead encased telephone cable was one of the handsomest of the kind ever shown and included its well known line of telephone cable, both in single and double wrap insulation, telegraph and power cable in single and multiple conductors, and a special anti-capacity telephone cable of novel design which was the centre of much interest. Visitors were cordially greeted by its manager, John B. Adams, assisted by Mr. Hiles of its Chicago branch.

THE WESTERN STEEL GATE COMPANY, Two Rivers, Wisconsin, exhibited the Western pole-hole digger.

THE WESTERN TELEPHONE MANUFACTURING COMPANY, Chicago, was represented by C. L. Johnson, G. H. Johnson, W. G. Peacock and M. Noyes. The company displayed a new line of telephone apparatus. A new magneto self-restoring switchboard drop was shown for the first time.

THE WILLIAMS TELEPHONE AND SUPPLY COMPANY, Cleveland, Ohio.—This company showed a mechanical drop for rural switchboards, also complete rural boards. C. W. Hunt, secretary and treasurer; W. R. Horning, electrical engineer, and C. P. Mebane were in charge.

EUROPEAN FACTORY SECURES SERVICES OF AMERICAN EXPERT.

THE Antwerp Telephone and Electrical Works, of Antwerp, Belgium, has recently closed a contract with Edward Schwartz whereby the latter will take charge of the works as general superintendent. Mr. Schwartz is a native of Austria, and prior to his coming to America sixteen years ago was regarded as an expert tool maker. His first position in this country was in the manufacturing department of the Bell company as tool expert, and later he designed from the mechanical standpoint a great deal of the Western Electric Company's apparatus. In 1900 he severed his connection with this company, and has since been employed by some of the leading Independent manufacturers as mechanical superintendent. The results of his investigations and work are to-day being applied to the manufacture of various metal parts which enter into the construction of telephone apparatus. The Antwerp Company selected Mr. Schwartz, after a careful investigation of his qualifications, as being the best man available to conduct the mechanical department of its plant.

THE UNITED TELEPHONE AND SWITCHBOARD COMPANY, Orrville, Ohio, succeeding the Gemmill Telephone and Manufacturing Company, recently damaged by fire, has moved into its commodious modern factory. This company manufactures a full line of high grade telephones which are fully guaranteed for five years. Amongst the many pieces of apparatus is a new type desk stand having the switch mechanism, induction coil and cord terminals mounted in the base, making a very substantial instrument and at the same time one which can be easily examined at any time. Catalogues, prices and sample telephones will be sent upon request.

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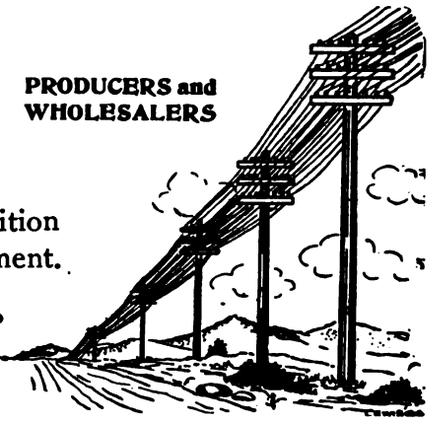

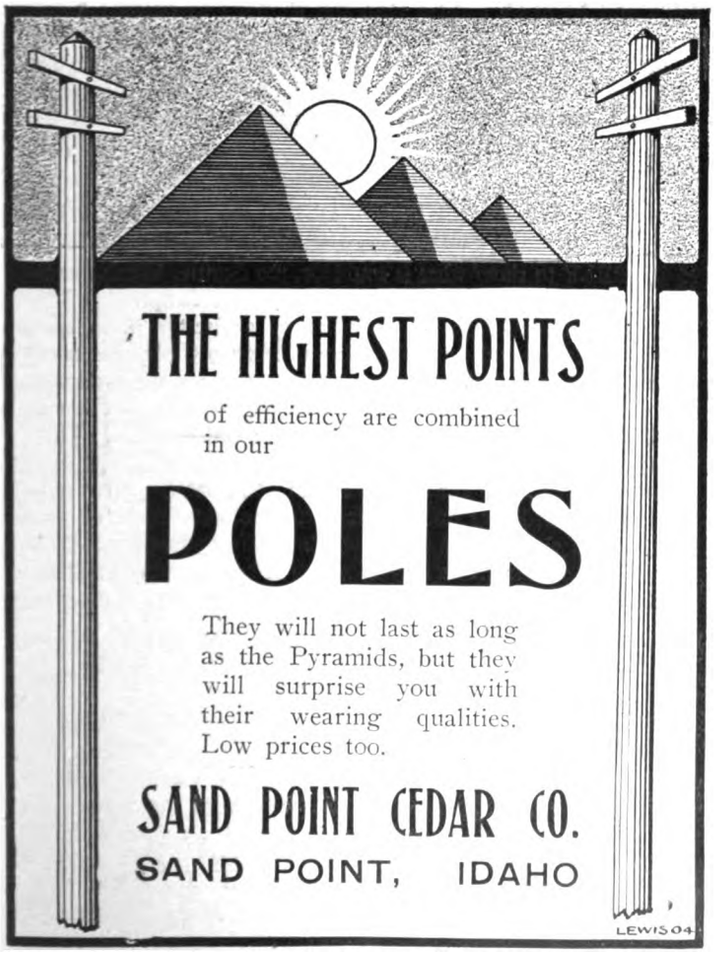

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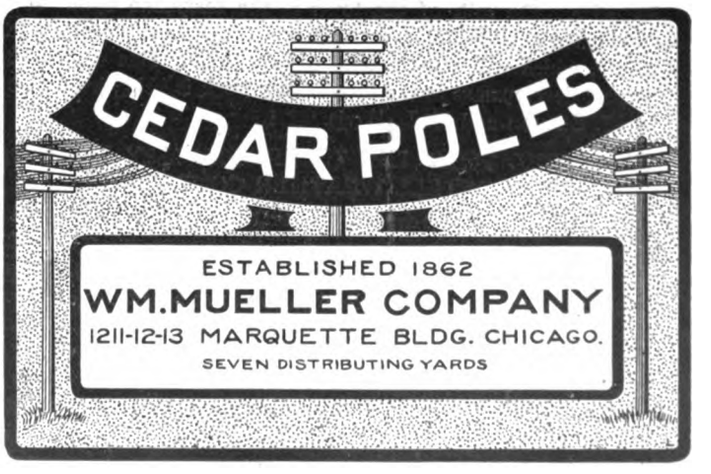

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IN THE OPERATING FIELD.

MICHIGAN INDEPENDENT TRAFFIC MEN MEET IN GRAND RAPIDS.

AT the recent session of the Michigan Independent Telephone Traffic Association, which was held at the Exchange building of the Citizens' Telephone Company, in Grand Rapids, Mich., a number of important questions were considered, among which was the handling of toll line service. A number of interesting papers were read. The following telephone men attended: C. E. Tarte, of the Citizens' Company, president; Dr. J. G. Root, of the Lake Shore Company, secretary; M. B. Overly, of the United States Telephone Company, Cleveland; E. B. Fisher, of the Citizens' Company; H. A. Price, and F. H. Howard, of the Valley Telephone Company, Saginaw; W. J. Melchers, of the Union Telephone Company, Alma; R. B. McPherson, of the Livingston Home Company, Howell, and W. O. Hunt, of the Adrian Telephone Company, Adrian.

AMSTERDAM, N. Y., INDEPENDENT COMPANY IS WINNING TELEPHONE FIGHT.

AT Amsterdam, N. Y., there is a hot telephone fight raging. The Amsterdam Automatic Telephone Company had, for the past three years, been losing ground on account of inferior equipment and was in rather ill repute locally. The Hudson River Bell Company had installed an up-to-date common battery system and put up a new exchange building. A multiple tap distribution plant, a new North Manual Switchboard and a new exchange building were installed for the Automatic Company, under the direction of Le Roy Stanton, the engineer. At first it was found difficult to interest people in the Automatic service. Almost all who were solicited for an Automatic Company's telephone said: "When you show us you can give us good service and when we can reach as many subscribers over your telephone as over the Bell we will give you our order." By means of solicitors and advertising in the local columns of the daily papers the tide was finally turned.

Twenty-three days ago the Automatic Company opened its manual office. In that time it has been so successful that the Bell Company has imported a large number of solicitors and is making a house-to-house canvass, insisting on the people taking a free telephone for an indefinite period. The Independent company is installing from fifteen to twenty telephones a day and has not cut its price. The talk of the town is the telephone fight. It is anticipated that finally there will be a telephone for every ten people, which will make a total of over 2,500. This will be the densest development in the East. This work is being handled by L. W. Stanton and H. L. Davis.

SUGGESTED THAT THE TELEPHONE MAY BE MADE TO FORETELL WEATHER CONDITIONS.

A REPORT comes from Paris that a new use has been discovered for the telephone. The suggestion is that the telephone may be used as a barometer. The report says: "Having planted two iron rods in the earth at a distance of about twenty feet one from the other, connect both with the wires from the telephone. The soil in which the rods are driven must be well soaked every night, for ten days, with a solution of hydrochlorate of ammonia. Then by listening at the telephone one will be able to forecast the weather at least twelve hours in advance more accurately than with any barometer. If a crackling or pattering noise, like that of hailstones on a roof, is heard, a rainstorm is not far distant. A low, murmuring sound, described poetically as "like the distant twittering of birds," foretells a sudden change in the temperature." No statement is made as to whether the discovery has, as yet, had any practical application.

CUYAHOGA SHOWS EXCELLENT GROSS EARNINGS FOR THE FIRST FIVE MONTHS THIS YEAR.

THE report comes from Cleveland, Ohio, that the increase in the gross earnings of the Cuyahoga Telephone Company for the first five months of 1905 are shown by months as follows: January, $9,715; February, $10,624; March, $11,694; April, $12,837; May, $12,538; total, $57,408. The increases for the remaining months of the year will doubtless be larger than for the first five months, and it would not be surprising if they would average $13,000 a month, or $91,000 for the seven remaining months of the year. This would make an increase in gross earnings for the year 1905 of about $150,000. These figures will probably be exceeded, as the Cuyahoga has shown that it grows faster than its directors and officers anticipated.

The operating expenses will not grow in the same proportion as the increase in gross, and therefore the showing in the surplus gains will be much greater than the showing in gross earning gains. In this connection it might be well to state that operating officials of the Cuyahoga Telephone Company report, that there is no let-up in the demand for telephones and that they are quite confident that the total number of telephones in service of the Cuyahoga Telephone Company by January 1, 1906, will exceed 21,000.

SEATTLE, WASH., INDEPENDENT COMPANY DOES SOME RAPID PRIVATE BRANCH INSTALLING.

MERELY to show what it could do, the Seattle, Wash., Independent Telephone Company installed a complete private branch exchange in the office of a Seattle newspaper, with ten stations and four trunk lines, between 8 o'clock in the morning and 11 o'clock at night. The contract for the exchange was signed at 5 o'clock Thursday afternoon, and Contract Manager Bixby promised to break all records in the installation. Early in the morning eight men were at work and were kept going until the system was ready for service fifteen hours later. Mr. Bixby says that the ordinary time required for the installation of such an exchange would be at least a week. This company has been noted for the expeditious way in which it handles new business. Every effort is being made to eradicate delays as much as possible.

STROMBERG-CARLSON CO. GETS CONTRACT FROM KINLOCH TELEPHONE CO. FOR 12,600 LINE BOARDS.

THE Stromber-Carlson Telephone Manufacturing Company of Rochester, N. Y., just secured the contract for a new switchboard for the Kinloch Telephone Company of St. Louis. The new switchboard, which will be of the three wire type, will be installed as soon as possible with an immediate capacity of 12,600 lines and an ultimate of 17,000. This order is one of the largest ever placed for multiple apparatus. The switchboard which it will displace is of the Kellogg divided multiple type.

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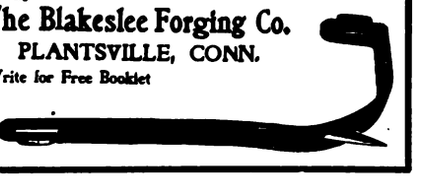

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Voltmeters, Ammeters, Millivoltmeters, Voltammeters Milammeters, Ohmmeters, Portable Galvanometers, Ground Detectors and Circuit Testers.
Our Portable Instruments are recognized as THE STANDARD the world over. Our STATION VOLTMETERS AND AMMETERS are unsurpassed in point of extreme accuracy and lowest consumption of energy.

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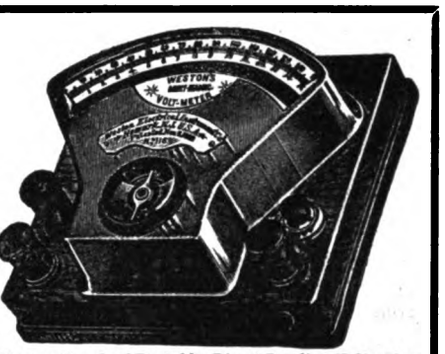

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all apparatus that we make. That is the reason why our apparatus is used exclusively wherever introduced. Candidly speaking, don't you think you had better investigate our claims before placing your next order elsewhere?

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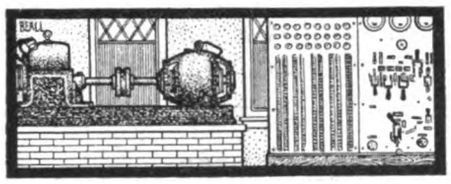
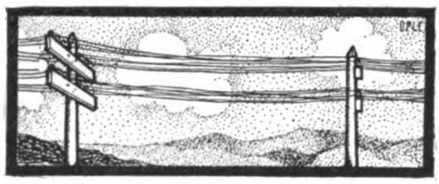


QUERIES

Questions on any subject relating to telephony will be answered on this page.



INDUCED VOLTAGE ON TELEPHONE LINES.—(572.)

A lineman, friend of mine, employed by a Western High Voltage Power Company was killed by a current from the telephone wires. He stepped in a booth which is insulated from the ground to use the telephone and put his hand on the telephone generator crank to ring, and at the same time he slapped another lineman, who was standing on the cement floor, on the shoulder, and got a shock that killed him. The man standing on the floor was badly burnt. The telephone lines is privately owned by the company, and is on the same poles as the high tension wires for the entire distance, about twenty miles, and is metallic circuit. The telephone brackets are about six feet below the alternating power wires. The alternating system is 20,000 volts, three phase. The telephone wires are 14 iron B. B. and insulated on glass. The telephone circuit is transposed quite often. Now I don't understand how there was enough current on these telephone wires to kill my friend.

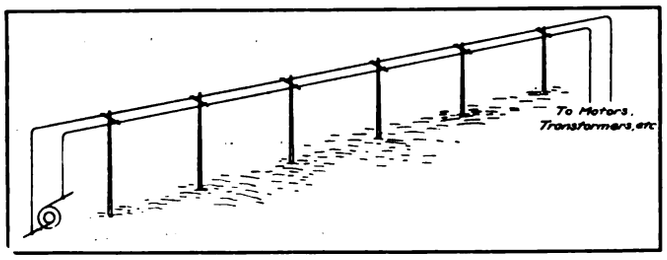


Fig. 572A.

The telephone wires, they claim, did not touch the power wires at any point. I understand that there was a ground on the power wires at the time, but do not see how that could make a difference. I think that the telephone wires were touching the power wires some place. It may be that the question involves something about alternating currents; I don't understand. I have never had much education, and don't know very much of the book part. I will appreciate it if you will try to explain this to me, using diagrams as you usually do on your query page. M. S. F.

The question which you ask us is naturally one we cannot answer directly, but the following suggestions may help you:

Consider the power transmission in Fig. 572A; if the entire power system is perfectly insulated from the earth and the line wires are separated not more than 2 or 3 feet, there will be comparatively little induction in circuits over 10 or 15 feet distant. Such inductions as there is will be of the nature to set up a potential difference between the two wires of a circuit and not between both wires (as a whole) and the ground. This arises from the fact that the electric charge and the lines of magnetism in the air, about the wires, are confined to a space immediately about the wires, because of their small separation of only 2 or 3 feet. As the separation of the wires increases, the electric charge and the magnetic lines extend farther from the wires and the inductive effects on adjacent parallel lines increase. The lines of magnetism referred to are those which exist around any wire conveying a current; the electric charge is merely the charge which the line as a whole receives because of the difference of potential (or voltage) between the wires, the two wires of the line constituting a condenser.

The transmission shown in Fig. 572B employs only one line wire and uses the earth for a return. The electric charge and the magnetic lines are now distributed through the whole space between the line wire and the earth and are of considerable magnitude at distances away from the wire equal to its elevation above the earth—25 to 30 feet. The inductive effects on parallel lines will be such as to create not only a difference of potential between the wires of these lines, but a difference of potential between these lines and the earth.

Suppose that one wire of the transmission line in Fig. 572A becomes grounded at only one place. These wires, instead of having no potential with respect to the earth, will be—one at earth potential or zero, and the other at a potential above the earth equal to the voltage of the generator. The line, considered as a condenser, will be composed of the grounded wire and the earth as one plate and the other wire as the opposite plate. The transmission line is still operative, but the distribution of the electric charge in the space about the line will approach that of the transmission line in Fig. 572B. The effect on adjacent lines will be to induce charges on them having a potential, not only between the wires, but between the lines as a whole and the earth.

That is, a telephone metallic circuit on a transmission line would not be at a potential above the earth when the power circuits are perfectly insulated from the earth. When a ground occurs on one of the power wires the inductive disturbances are immediately altered and increased; and a potential exists between each and both of the telephone wires and the earth. This potential to which the telephone wires are raised with respect to the earth may reach a considerable percentage of the generator voltage—easily 10 per cent or 15 per cent.

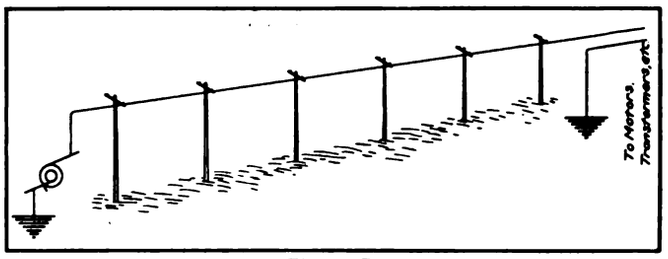


Fig. 572B.

It is generally understood that fatality from electric shock is determined by the magnitude of the current which passes through the victim. This being the case, it is apparent that the telephone circuit must be parallel to the power line for a distance such that the total charge on the telephone wires, in passing to earth, will constitute a current of fatal magnitude.

In the case of which you write, the transposition of the telephone line had no bearing on the potential of the telephone wires with respect to the earth. The nature of the ground on the power line, whether it was a good earth connection or an imperfect one having considerable resistance, has a bearing on the question. A high resistance connection to ground will not elevate the telephone wires to so great a potential with respect to the earth. While we have used a single phase power line to illustrate this matter, the deductions apply to three phase lines.

SWITCHBOARD POSITION.—(573.)

What is meant by a Switchboard Position? T. C. R.

Arthur Vaughan Abbott in his "Telephony" defines thus: Every switchboard may be considered to be made up of a number of exactly similar, yet entirely distinct, units, each unit being that amount of apparatus necessary to the vocation of *one single operator.* Such a collection of apparatus is called a position, so it is usual to speak of a switchboard as having so many positions. As each position of each kind is similar to all the others of the same kind, the total cost of the board is easily obtained by multiplying the cost of each kind of a position by the number of each.

In cities where there is more than one exchange the switchboard positions are frequently subdivided into two classes, "A" and "B." An "A" position is one at which the subscribers' lines terminate and a "B" position is one where the local trunks from the other exchanges terminate.

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one way of doing a thing and that is the right way.

But the right way is not always the same. The right way to do a thing to-day may be the wrong way to-morrow, because a better method has been evolved for doing that particular thing.

This applies even to so small a thing as connecting a wire to a dry battery. That is why you should know about the Fahnestock Spring Binding Post.

It is admitted to be the best method yet evolved for connecting a wire to a dry battery, or, in fact, to any piece of electrical apparatus, and this is the best reason we can give for asking you to specify Fahnestock connector on your batteries the next time you order.

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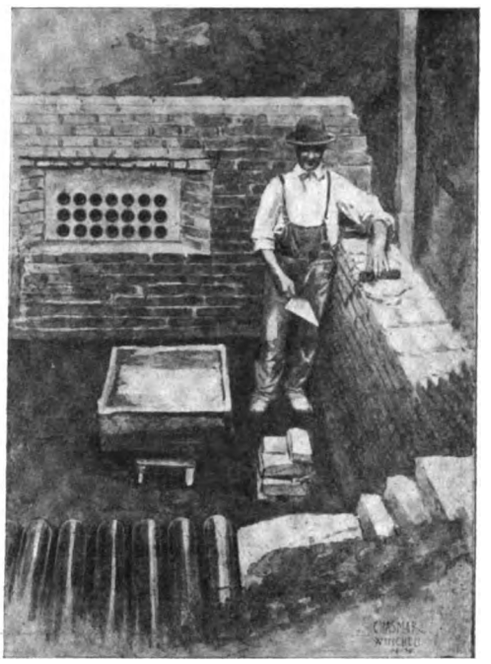
BITUMINIZED FIBRE CONDUIT For Underground Construction



The American Conduit Company has a corps of experts in underground construction and is prepared to furnish supervision of work if desired. We would prefer to co-operate with contractors in underground construction, but if desired will submit estimates and bids and take contracts for completed underground systems in any part of the United States or Canada.

AMERICAN CONDUIT COMPANY,
Main Offices, 1005-6 Manhattan Building, Chicago
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Malleable Iron Guy Clamps

We Galvanize by Hot Process.
Manufactured by
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20 and 25 foot lengths for rural telephone lines a specialty.
PORTER CEDAR CO., Saginaw, Mich.

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J. I. M. WILSON COMPANY

Wholesale Producers

Bessemer Building **PITTSBURG, PA.**

WHITE CEDAR POLES

Buy from the Producers and Save Jobbers' Profits.

PENDLETON & GILKEY, - Minneapolis, Minn.

We Make a Specialty of Telephone Poles.

POLES

Large Stock 15 to 25 ft. 4 to 6 in. Tops For Rural Lines

YARDS: Menominee, Mich. Escanaba, " Cloquet, Minn. Heron, Mont. Cabinet, Idaho. Chicago, Ill.

FRANCIS BEIDLER & CO. 489-519 W. 22d St. CHICAGO, ILL.

SILVER ANNIVERSARY IN POLE BUSINESS

Just bought out—MALTBY CEDAR COMPANY

Together with our own large stock we are prepared to fill any size Pole Order at once. Sorting and shipping yards all thru Michigan.

Michigan White Cedar outlasts any wood. We make a specialty of Michigan Cedar. We also produce TIES and POSTS in large quantities.

Principal Office: Monroe, Mich.
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Prevent Rot, and Double the Life of Poles, Crossarms and other woodwork by using

AVENARIUS CARBOLINEUM (*registered*), the only reliable, practical and economical preparation in its line.
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J. S. BOGGS :: :: ALBANY GA.

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WRITE ME FOR ANYTHING YOU WANT IN THIS LINE

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THE WEEK'S MESSAGES

FINANCIAL.

ATCHISON, Kas.—The Independent Telephone Company has decided to increase its capital stock from $25,000 to $150,000.

TRENTON, MO.—The Trenton Telephone Company has increased its capital stock from $8,000 to $50,000.

FRANCHISES.

SAN FRANCISCO, CAL.—The Home Telephone and Telegraph Company has applied for a franchise to enter San Francisco.

MARION, IND.—The Converse Telephone Company has applied for a franchise in Marion, Ind.

MARCELINE, MO.—The Western Telephone Company has applied for a franchise at Marceline.

PARK CITY, UTAH.—The Utah Independent Telephone Company has been granted a franchise in Park City.

COMBINATIONS.

TAYLORVILLE, ILL.—Negotiations are under way to consolidate all the Independent telephone lines of Christian county with the Home Telephone Company of Taylorville, which was recently incorporated with a capital stock of $50,000.

BERRYVILLE, VA.—The Frederick & Clarke Telephone Company and the People's Telephone Company have consolidated.

ELECTIONS.

GREENE, N. Y.—The Chenango-Broome Telephone Company has elected the following officers: President, J. D. Van Valkenburgh; vice-president, Mason Hollenbeck; secretary and treasurer, George W. Webb.

McKINNEY, TEXAS.—The McKinney Telephone Company has elected the following officers: S. O. Scott, president; J. E. Farnsworth, vice-president; F. E. Bedlow, secretary; J. Spain, treasurer.

NEW COMPANIES.

ODIN, ILL.—The Odin and Sandoyal Township Telephone Company, at Odin, has been incorporated with a capital stock of $600. Incorporators: A. J. McClelland, George Rose and others.

PETERSBURG, ILL.—The Egan Electric and Telephone Manufacturing Company, Petersburg, has been incorporated with a capital stock of $100,000. Incorporators: C. E. Egan, J. S. Hurie and T. W. McNeely.

CRAIGVILLE, IND.—The German Telephone Company, recently organized, is to be incorporated with a capital stock of $10,000. Construction work will be commenced at once.

NORTH ORANGE, MASS.—Telephone Line No. 4 has been organized, with S. J. Oliver as president, and H. P. Paul as secretary and treasurer.

MINNEISKA, MINN.—The Valley Telephone Company, with principal offices at Minneiska, has been incorporated with a capital stock of $5,000. President, Frank Hartman; vice-president, Fred Zimmerman; secretary, H. A. Callahan.

SLEEPY EYE, MINN.—The Granite Falls Telephone Company has been organized with a capital stock of $50,000.

GUTHRIE, OKLA.—The Oklahoma Farmers' Telephone Company has been incorporated with a capital stock of $10,000. Incorporators: H. M. Ferguson, Guthrie; E. P. Wilkerson, W. M. Hatfield and A. G. Childers, of Mulhall.

PERSONAL.

GEORGE W. SEAMAN has been elected manager of the Home Telephone Company, of Fremont, O., and W. H. Whitmore, of Elyria, has been chosen as superintendent of maintenance and construction.

E. L. SWAIN and C. C. CRAIG have been chosen to fill the recently created positions of assistant general manager and second assistant general manager of the Los Angeles, Cal., Home Telephone Company. Mr. Swain formerly was assistant general superintendent of the Southern Pacific Railroad. Mr. Craig has been, and still is, cashier of the Home Company, a position the duties of which he will continue to discharge for the present.

ROSCOE HOWARD has been appointed manager of the Home Telephone Company, of San Diego, Cal., and will assume his new duties on July 1. Mr. Howard is also secretary of the Association of Home Telephone Companies recently formed in Los Angeles.

C. H. GRAVES, of Duluth, Minn., who was recently appointed United States Consul at Sweden, has resigned as president of the Duluth Telephone Company, and has been succeeded by the former vice-president of the company, H. J. Pettengill, of Minneapolis. The change is effective July 1, next. C. P. Wainman, of St. Cloud, will succeed Mr. Pettengill as vice-president of the Duluth Telephone Company and of the Mesaba Telephone Company.

BRITT ANDRUS has been appointed manager of the Holley Bell, N. Y., Telephone exchange and will also have charge of the new lines in Kendall. He succeeds J. A. Healey, who has been acting manager.

WALTER S. BAKER has resigned as the Salem, Pa. manager of the Interstate Telephone Company, to take effect July 1.

R. ARMSTRONG, of the Morrisonville, Ill. Independent Telephone Company, has accepted the position of manager of the Taylorville Home Telephone Company.

J. L. TRANSUE, of Sodus, N. Y., has been elected to the position of general manager of the Wayne-Monroe Telephone Company, of Lyons.

G. R. JOHNSTON, recently elected to the position of general manager of the Citizens' Telephone Company, of Columbus, O., has assumed the duties of his position.

R. L. ADAMS, who resigned recently as manager of the Southern Bell Telephone Company at Birmingham, Ala., has been reappointed as manager of the office and on the staff of the vice-president. Mr. Adams will be in charge of the district and will be the special agent of the company.

F. G. CRUICKSHANK has been elected to succeed A. R. Metcalfe, who died recently, as counsel for the Home Telephone and Telegraph Company, of Pasadena, Cal.

E. E. THOMPSON, former manager of the Iowa Telephone Company at Boone, has been transferred to Des Moines to the management of the company there.

JOHN ROSENBERG has been made manager of the Farmers' Mutual Telephone Company at Vinton, Iowa, vice George Urice, who has resigned. Mr. Rosenberg has been with the Benton County Telephone Company for several years.

CHARLES A. CARL, who for the past three years has been manager of the Carlisle district of the Home Telephone Company at Carlisle, Pa., has been transferred to Chambersburg. He will be succeeded by a Mr. Snyder, who comes from Harrisburg.

OBITUARY.

E. E. NAUGLE, president of the E. E. Naugle Tie Company, of Chicago, was killed in the wreck of the Twentieth Century Limited at Mentor, Ohio, on Wednesday evening, June 14.

CONSTRUCTION.

ROCKFORD, ILL.—The Home Telephone Company is to establish long distance connection with many Wisconsin towns.

ELKTON, MD.—The Farmers' Telephone Company is to extend its line to Port Deposit.

ST. PETER, MINN.—The Nicollet County Telephone Company is to construct several rural lines.

NAPOLEON, MO.—The Napoleon Telephone Company is to extend its lines.

CONEWANGO VALLEY, N. Y.—The Conewango Valley Home Telephone Company will spend $2,000 in extending its lines.

DONNYBROOK, N. D.—The Donnybrook Telephone Company is to extend its rural lines.

DORSET, O.—The Dorset Telephone Company is extending its lines.

ALBION, PA.—The Springfield Telephone Company is extending its lines.

CONESTOGA, PA.—The Conestoga Telephone and Telegraph Company is extending its lines.

LOYALSOCK, PA.—The Loyalsock Telephone Company is to extend its lines from Farragut to Huntersville, and from Warrensville to Ball's Mills.

FORT WORTH, TEXAS.—The Texas Consolidated Long Distance Telephone Company is to build a line to Fort Worth.

MALONE, TEXAS.—The Malone Telephone Company is to build a line from Malone to Hillsboro.

SOUTH RYEGATE, VT.—The South Ryegate Telephone Company is to build a line to Newbury.

WEST TOWNSEND, VT.—The Globe Mountain Telephone Company will extend its line from West Townshend to Chester.

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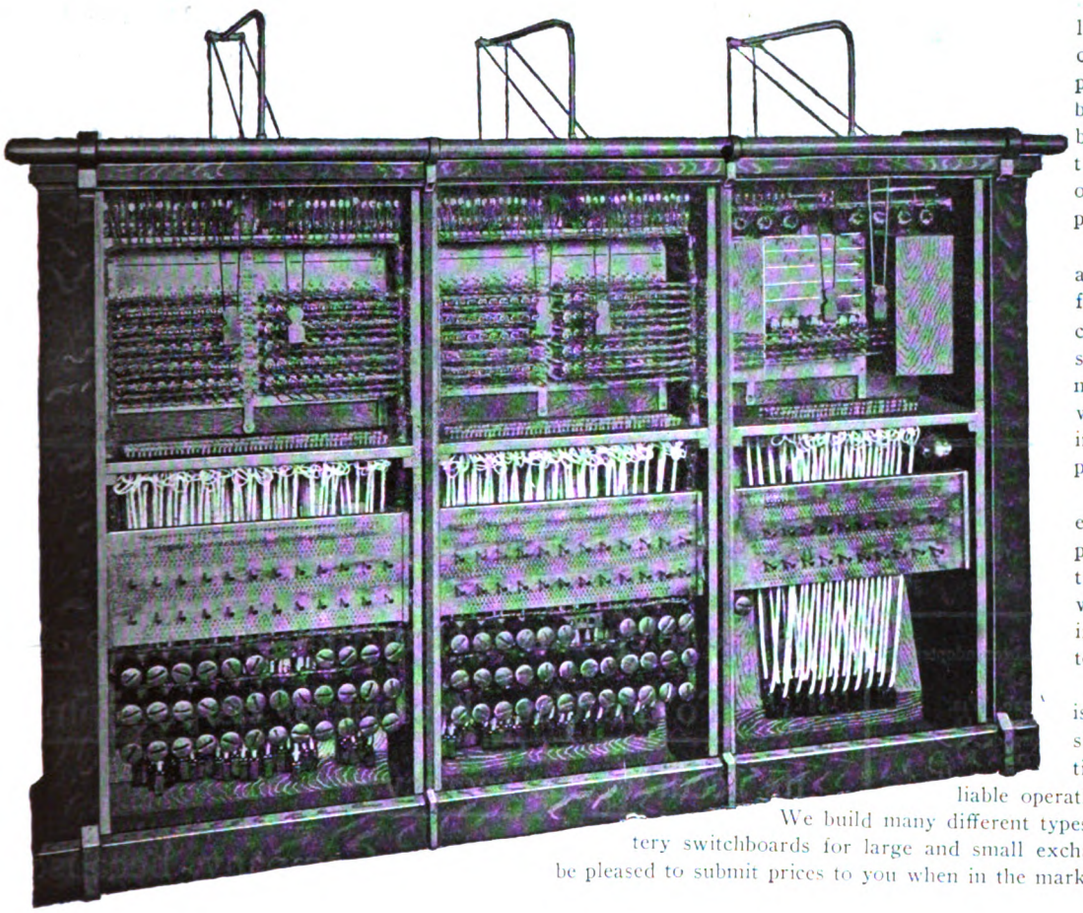
CENTURY
100 % GOOD

Common Battery Switchboards



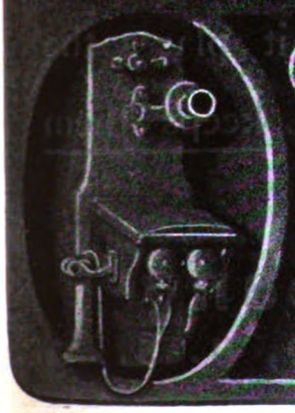
The above cut illustrates the back of one of our three position common battery switchboards, and shows the arrangement of the different parts.

Every piece of apparatus is so fastened that it can be easily inspected, and, if necessary, removed without interfering with any other parts.

In the back of each position is provided a distributing board on which all lines in that position terminate.

All the apparatus is exceedingly simple in construction, assuring reliable operation at all times.

We build many different types of common battery switchboards for large and small exchanges, and would be pleased to submit prices to you when in the market.



CENTURY TELEPHONE CONSTRUCTION CO.
536 ELLICOTT SQUARE
BUFFALO, N.Y.

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MONARCH SWITCHBOARDS

Our study of small exchange requirements has helped us to design magneto boards exceptionally well adapted to the service desired. Our well known methods of honest and careful construction make these boards efficient and substantial.

We are in a position to quote upon and build magneto exchanges of any size and solicit your inquiries.

Our new switchboard catalog is now ready for distribution and will be mailed upon request. The descriptions of MONARCH BOARDS will interest you.

MONARCH TELEPHONE MFG. COMPANY

10-16 So. Clinton St. Chicago, Ills

The Automatic

Among the cities in which it has been adopted are:

Chicago, Ill.	Medford, Wis.
Grand Rapids, Mich.	St. Marys, O.
Columbus, O.	Woodstock, N. B.
Dayton, O.	Westerly, R. I.
Lincoln, Neb.	Manchester, Ia.
Portland, Me.	Princeton, N. J.
Auburn, N. Y.	Albuquerque, N. M.
Lewiston, Me.	Van Wert, O.
Auburn, Me.	Battle Creek, Mich.
Fall River, Mass.	Clayton, Mo.
New Bedford, Mass.	Pentwater, Mich.
Los Angeles, Cal.	Toronto J'ct'n, Can.
San Diego, Cal.	Wilmington, Del.
Hopkinsville, Ky.	Riverside, Cal.
Sioux City, Ia.	Traverse City, Mich.
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Columbus, Ga.	Wausau, Wis.
South Bend, Ind.	El Paso, Tex.
Augusta, Ga.	Berlin, Germany.

is the telephone system that appeals to all;

To the User, because of its promptness, its accuracy, its secrecy;

To the Operating Company, because of its economy of operation and maintenance;

To the investor, because it places the securities of a telephone company on a firm basis, and keeps them stable and profitable.

Automatic Electric Company

Van Buren and Morgan Streets CHICAGO, U. S. A.

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DEAN TELEPHONE APPARATUS

Express Type Switchboard Operator's Sets

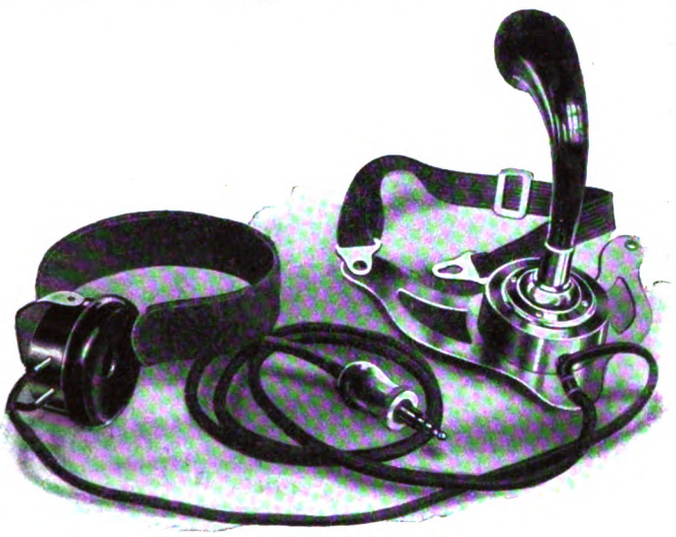

Fig. 1.

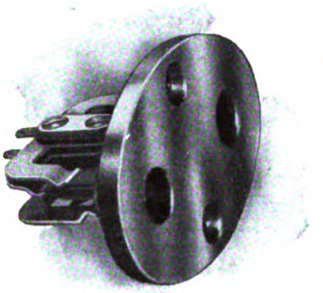

Fig. 2.

We are prepared to furnish our new breast-plate transmitter operator's set on our Express Type Switchboard instead of the regular suspended type transmitter, when so desired.

This new operator's outfit, shown in Fig. 1, consists of an all aluminum frame transmitter, head receiver, silk covered connecting cords and a new design of four conductor connecting plug. The latter is made to eliminate the usual troubles of loose cord connections and undue breakage of the cord where it enters the plug.

The transmitter is extremely light in weight, powerful in action and made to stand rough usage. The working parts are interchangeable with those of the standard Dean transmitter, thus insuring the best possible results.

The cut-in jack, Fig. 2, used with this outfit, is of the twin type, the extra jack being provided for emergency use or for connecting a learning operator's set. The removal of the plug from the jack opens the transmitter circuit, so as to prevent waste of current when the operator leaves the switchboard.

The use of the breast-plate transmitter forces the operator to always talk directly into the instrument regardless of her movements, and gives her the free use of both hands for operating. Her **labors** are thereby made **lighter** and the **service** made **better.**

Our *magneto express type switchboards* have many other devices for bettering the service and simplifying the work of the operator and the switchboard man.

Let us figure on your next switchboard and telephone equipment. Our prices are right.

THE DEAN ELECTRIC COMPANY
ELYRIA · OHIO

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DRY BATTERY

Sold under a guarantee.

E. M. F. 1.52; 14 to 18 amperes.

Cost no more than inferior cells.

Fahnestock Clip.

STERLING

WHAT DO YOU USE ? ? ?

Will not run down on the shelf.

Will last longer than other good cells.

Will save you money.

Binding Post.

Do They Satisfy You?

STERLING ELECTRIC COMPANY, La Fayette, Indiana

THE BULL TONGUE

IS AN ANCHOR THAT HOLDS

35 Cents Worth Does the Job

Get Wise

Our Circular is Yours. Ask!

BULL TONGUE LAND ANCHOR

141 SOUTH CLINTON ST., CHICAGO

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IT WILL PAY YOU!

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BAIRD PAY-STATIONS

And Increase Dividends

9/10 of the Telephone Companies in U. S. and Canada using Pay-Stations buy BAIRD'S

Investigate Our Liberal Trial Offer on

Secret-Service Telephones

"Lock-Out and Selective Ringing"

This Type Made With From 1 to 5 Slots

Descriptive Catalogue Sent Upon Request

Baird Manufacturing Company

Manufacturers of Baird Secret-Service Telephone System

6 MICHIGAN ST., CHICAGO

Ready Pole Seats

Strongest Pole Seat Made.

All Iron, adjustable to any Pole.

Ready Reels, Tools, &c. Cable and Telephone Supplies

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HAVE YOU EVER TESTED MORGAN & WRIGHT TAPE?

A good, fair test is enough to convince anybody that it is good tape—better tape, perhaps, than you supposed could be made. A postal request will bring samples post-haste.

MORGAN & WRIGHT, CHICAGO

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Kellogg Intercommunicating Systems

Are Perfect in Every Detail

No slightest part is experimental. Everything tried and thoroughly proved before leaving us.

Kellogg Switchboard and Supply Company

Congress and Green Streets, Chicago

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116 Nassau Street	Keystone Telephone Building	Electric Building	Seymour Building

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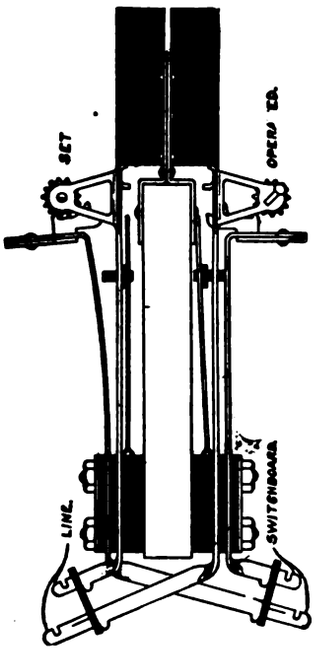
PROTECT YOUR SWITCHBOARD

against lightning and against either heavy or sneak currents with

COOK'S No. 8 SELF SOLDERING PROTECTOR



No bolt or soldered connections used in transposing the line and switchboard terminals.

Cook's Self Soldering Coil will *always* operate—on sneak currents, as well as on heavy currents.

Cook's No. 8 is the only protector covered by broad patents. Cook's test plug, which is sent **free** with all orders for No. 8 Protectors, is **the only test plug on the market covered by patents.** All others are infringements.

WRITE FOR PARTICULARS

Frank B. Cook.

Manufacturer

238 West Lake St. CHICAGO

OUR NO. 38

The Peer Of All Automatics

Easy to Connect Up

Inter Communicating Non Interfering

Central Battery

Can be arranged for Branch Exchange Systems with Connection to trunk lines.

S. H. COUCH CO.

162 Pearl St. :: :: :: Boston, Mass.

How to Make Two Blades of Grass Appear Where Only One Grew Before

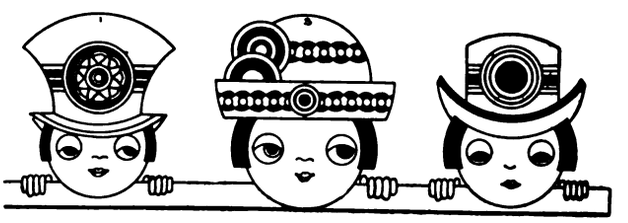
requires a certain amount of knowledge which costs time and money to acquire.

We will freely show you how to make duplicate copies of your toll and trouble tickets without the use of a separate carbon sheet if you will let us have your name and address.

Doesn't this proposition appeal to you?

General Manifold Company

FRANKLIN, PA.



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This receiver we have been showing for the past eleven years. Never found it necessary to change the style. Have a new receiver with an all rubber receiver shell, but still this—our original receiver is most often demanded.

Just one trial will prove to you our claim that this is the best receiver on the market. No other receiver has stood the test of years—the test of hard service on some of the longest and most frequently used lines in the country.

There is a reason why we manufacture such a perfect receiver just as there is a reason why the name STROMBERG-CARLSON stands for high quality when it appears on a telephone or telephone apparatus. One is that we build only from the raw materials. More careful inspection of both the raw material and finished product.

Note the illustration below. See how simple in construction our receiver is. One way in which it is superior to all others is the method of adjustment. Both the hard rubber shell and the receiver cap are entirely independent of the receiver proper, hence the adjustment is in no way affected by variation in temperature. You can use it without shell or ear cap.

If you are interested in securing a receiver which will give perfect service at all times, one that will stand the test better than any other, then get the STROMBERG-CARLSON STANDARD RECEIVER NO. 3.

Our Bulletin No. 11 tells all about our receivers and transmitters and contains much information of value to telephone users. We will send a copy free upon request.

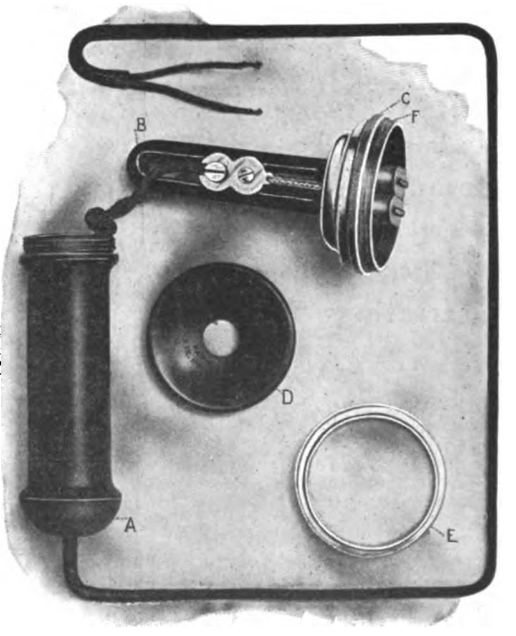
A—Rubber Shell for covering magnet.

B—Horseshoe magnet bi-polar type.

D—Ear Cap.

E—Adjustable cap for holding diaphragm in place. This is screwed down on cup F until the proper adjustment is obtained, then locked by ring C.

F—Nickel-plated brass cup into which the magnet terminates and is securely fastened.



STROMBERG-CARLSON TELEPHONE MFG. CO.

GENERAL OFFICES ROCHESTER, N. Y.

BRANCH OFFICE CHICAGO, ILL.

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STROMBERG-CARLSON CABLE

Stromberg-Carlson Make Lead Cable

The cable sheath is composed of pure lead unless otherwise specified. It is sometimes mixed with 3 per cent of tin which gives an increased mechanical strength. This is done in Aerial Cables where the mechanical strength of the lead covering is an important item. Pure lead pipe is just as efficient for underground cable. The only mechanical strain to which underground cable is subjected is during pulling in, which should be done with great care.

Great care must be used in running the pipe so that the sheath will be of ***uniform thickness*** and density. This is followed by rigid inspection.

The surface of every foot of pipe is inspected for flaws or pin holes by experienced men. This produces a pipe as near perfect as experience, care and modern machinery can produce.

STROMBERG-CARLSON TELEPHONE MFG. CO.
ROCHESTER, N.Y. CHICAGO

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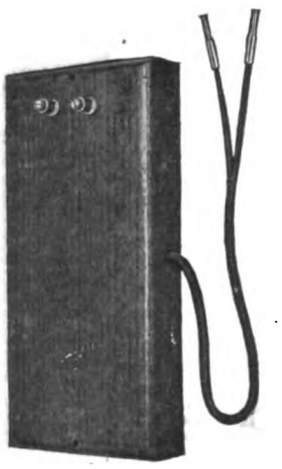
ANDRAE TELEPHONES NEVER DISAPPOINT

Every Andrae Telephone is built *right*. Every part of every Andrae Telephone is thoroughly tested before we allow it to be sold. That is why Andrae Telephones are always absolutely satisfactory—always efficient—always durable. We agree to "make good" every Andrae telephone that disappoints in any way, but we haven't found it necessary to "make good" one a morth out of the thousands we are selling. IF YOU INTEND BUYING TELEPHONES YOU CANNOT AFFORD TO BUY ANY BUT ANDRAE TELEPHONES—THE BEST.

J. W. Milton writes: Easiest thing in the world to sell Andrae Telephones in this territory because in making a test of the 45 Giant Bridging 'Phones, three extension bells and bell on switchboard we rang the last bell as distinctly as the first one on twenty miles of line.



Every Telephone on your line should be equipped with an ANDRAE Telephone Condenser

Made in Several Styles. Write for Circulars.

The accompanying cut illustrates our new form of Condenser, fitted in a handsome quarter-sawed oak case, which is especially adapted for use in connection with telephones ALREADY IN OPERATION.

Its construction obviates the necessity of an expert's services for its *successful installation*.

We will furnish any telephone company with as many Condensers as are necessary to equip an entire line. If not exactly as represented they may be returned to us.

WRITE FOR OUR FREE BOOK No. 11

JULIUS ANDRAE & SONS COMPANY

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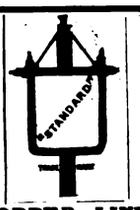

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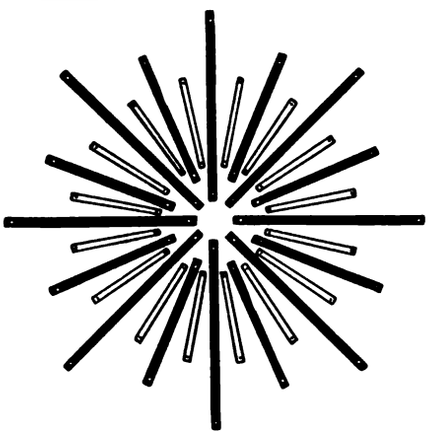

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Two Remarkable River Crossings

By John Putnam. (*Illustrations from photographs by the Author.*)

THE Enfield Division of the Southern New England Telephone Company comprises the towns (townships) of Enfield, Somers, Suffield, Windsor Locks and East Windsor. These towns are situated on both banks of the Connecticut River in the extreme northern part of the state of Connecticut. There is a telephone development in them of about five hundred stations. Ninety stations are in the small manufacturing village of Thompsonville, seventy-five are in Windsor Locks, a village of the same type, and one hundred and fifty are in Suffield, which is a prosperous residence community in the tobacco raising district. The remainder are scattered in the outskirts of these places and over the four towns. The map (Fig. 3) shows their relative locations and distances apart.

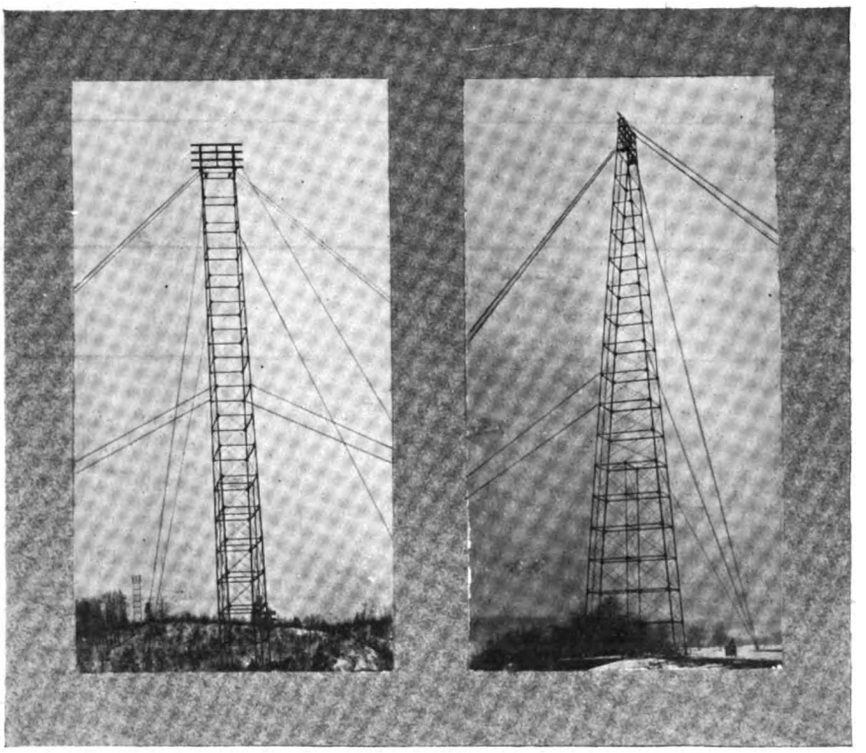

Fig. 1. Two views of the steel towers used to support the wires of the Southern New England Telephone Company in crossing the Connecticut River at Gildersleeve, Conn.

Subscribers in this division have free communication with each other regardless of their situation. The village of Windsor Locks was formerly the switching point, but as the business grew, the circuits became congested, and it was necessary to either establish three exchanges in the above named villages, or to get nearer the telephone center. It was decided to move the office from Windsor Locks to Enfield Bridge, where there was formerly a toll bridge crossing the Connecticut River. This bridge it was decided to abandon, so it was torn down and a suspension bridge put up by the Southern New England Telephone Company, the purpose of which was to carry cables across the river to meet the lines on the west bank. The river here is wide, shallow, and rapid, especially during floods, and the bottom is stony, not at all a desirable resting place for submarine cables.

The picture (Fig. 4) shows the crossing very well. In it you are standing on the east bank and looking west. The towers are of wood, that on the west bank being forty-five feet high, while the one on the east is thirty-three feet. They are designed to bear a pressure of 4.4 tons and 4.75 tons respectively. The span is eight hundred and fifty-five feet long. Think of it by comparing it with six one hundred and forty foot sections of open wire line. Two one inch Roebling steel suspension bridge cables, nine hundred and fifty-five feet long from anchorage to anchorage, support the pieces of 2 x 3 joist which form the floor of the bridge. These joists are four feet four inches long and are fastened twelve inches apart to the under side of the steel cables by "U" bolts. The telephone cables are laid on the joists between the bridge cables, which prevent their falling off. When the bridge was first erected, two 25 pair No. 19 gauge cables were carried across. Since then a 50 pair No. 22 gauge cable has been added. They are of the ordinary lead covered, dry core type, so familiar to telephone men, and they rest very comfortably and securely on their airy perch, for the towers are locked. If they were not, the slant of the bridge and spaces between the floor boards would make the walking dangerous.

When the company first moved its exchange to Enfield about three years ago, some cable across the bridge with the open wire lines was sufficient for its needs, but very soon lines became congested and aerial cables became necessary. Cable was run into Thompsonville and into Suffield and then, when the exchange was moved back to Windsor Locks, one big cable was erected to pick up the existing cable plant. The annual charges of three exchanges were figured against interest and depreciation on cables, and, as the cable hauls are all long, the question of transmission became important. As a consequence, the telephone engineering problems involved were pretty interesting, but that is another story. Suffice it to say that future plans for development in this region will probably provide for the abandonment or independence of this crossing. While it has never caused the company trouble

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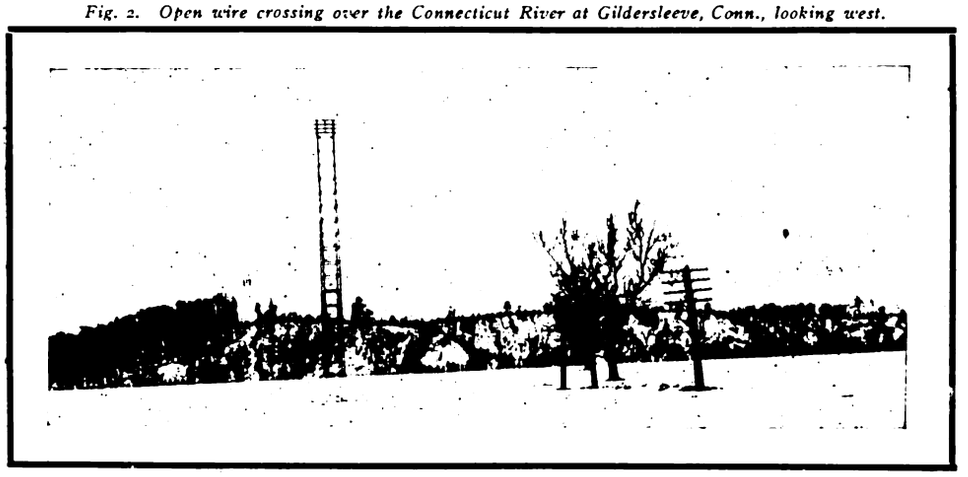
Fig. 2. Open wire crossing over the Connecticut River at Gildersleeve, Conn., looking west.



in the past there is lack of confidence in its future usefulness as a cable carrying structure.

Just north of Gildersleeve, which is north of Middletown, on the Connecticut River, the American Telephone and Telegraph Company has erected two tall iron towers to carry its New York-Boston wires (known as the Central Line), across the river. As the river is navigable at this point, these structures have to be of considerable height. The one on the east bank, Fig. 1, is one hundred and eighty-six feet high, that on the west, as it stands on a high bluff, is but eighty-six feet. The pictures were taken from the east side and give a pretty good idea of the imposing altitude of the east tower. Compare it in Fig. 2 with the horse and sleigh and the big tree to the right of it. These pictures were taken in a driving snowstorm and consequently do not show detail as well as they might have, had the day been clear. The towers are of tubular steel construction, well braced and strongly guyed. The length of the span is slightly over twelve hundred feet with a sag of forty feet and the wire is of No. 8 steel.

Roebling gives the breaking weight of that size steel wire as 2,138 pounds and its weight as seventy-two pounds per one thousand feet. This would give the weight of this span as about eighty-six pounds per wire. It is, by the way, a forty-wire line. Consequently, one of these wires, in addition to its own weight, would support a ton. A high authority in telephone engineering says that a half-inch coating of ice with a forty-mile-an-hour wind will break down any section of aerial wire. However that may be, a half-inch coating of ice on this span would add to its weight about four hundred pounds. A quarter-inch coating would only increase its weight ninety-one pounds, which it ought to bear very comfortably. More definite data regarding this crossing is not obtainable, but it is said that one sleet storm has laid the wires low. As you stand and look at them, you cannot but feel commiseration for the "trouble shooter" compelled to pull up the wires and splice them together at the wind-swept height of 186 feet.

Both crossings undoubtedly represent a considerable financial investment, and whether either company would, in the future, repeat the experiment is a difficult matter to predict.

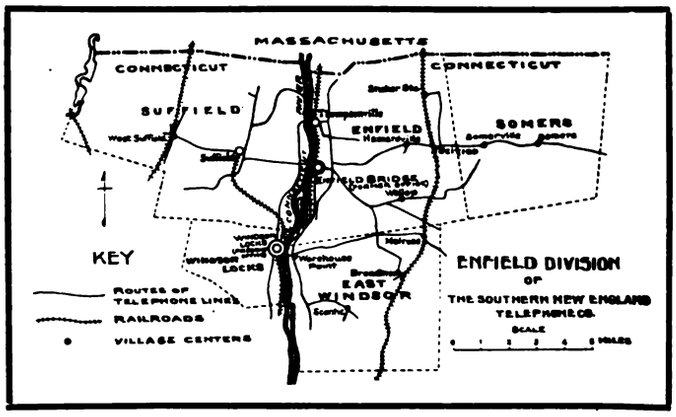


Fig. 3. Map of Southern New England territory, where these wire crossings are employed.

UNITED TEL. AND TEL. CO. MOVES OFFICES OF GENERAL SUPERINTENDENTS TO HARRISBURG.

THE offices of the General Superintendent and the General Traffic Manager of the United Telephone and Telegraph Company were moved from Philadelphia to Harrisburg on July 1. F. D. Houck is the general superintendent. W. P. Beardsley, who has been district superintendent at Harrisburg, has been promoted to traffic manager, vice C. Keeley Hagey, resigned. Mr. Hagey will for the present remain with the company in Philadelphia. The work of the district superintendent at Harrisburg, heretofore done by Mr. Beardsley, will be performed by Mr. Houck's office.

While it has not been definitely stated that the company has in view centralizing all of its offices at Harrisburg this has been announced semi-officially. The Capital City is more central, being easily accessible from all points of the compass. Four railway lines make easy communication with all parts of the State. The United Company has felt for some time, too, that Philadelphia is scarcely the place for its offices, for the United Company does not actually have a franchise in the city. The Independent company there is the Keystone, with which the United connects at the suburbs. Harrisburg is in the heart of a district covered with a network of United wires. Further, the general offices of the Pennsylvania Telephone Company, the Bell interests, are at Harrisburg, and it is therefore thought best to be on the ground to keep posted as to its movements.

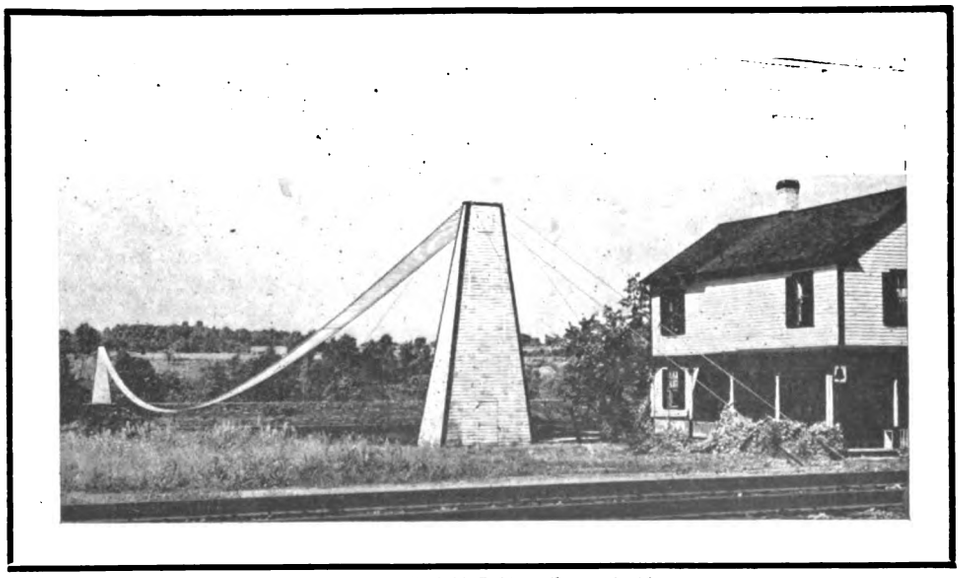


Fig. 4. Cable crossing at Enfield Bridge, Conn., looking west.

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The Pole Changer—Article II

By George H. Conklin.

THE circuit of the pole changer is shown in Fig. 2, in which *A* is the operating battery. From one pole a conductor *B* passes through switch *C;* then to the electro-magnet *D;* through this magnet to conductor *E;* to contact *F;* thence to spring *G* and back to the battery by conductor *H*. A slight inspection shows that when contact *G* is closed, magnet *D* will be excited and attract armature *I*, swinging it towards the magnet and opening contact *F*, and thus causing a constant recurrence of the cycle of operations described above.

The ringing battery is indicated by *J*; conductor *K* runs from

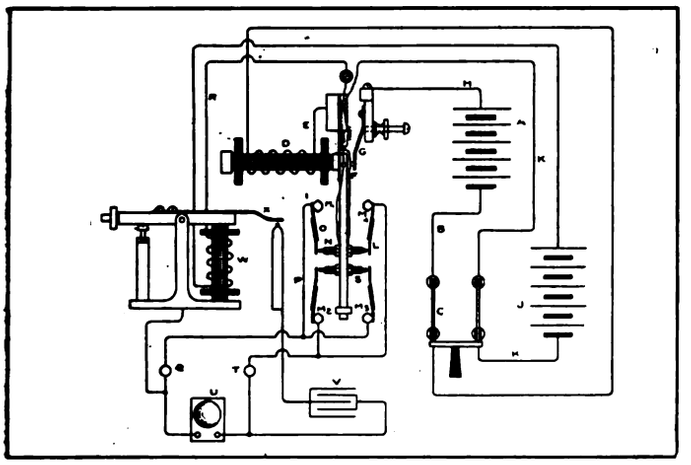

Fig. 2. Circuit Diagram of the Warner Pole Changer.

one pole of this battery through to the other side of the double pole switch *C*, thence by conductor *K* to the rear of the armature *I*. At the forward end of the armature four contact points may be seen; opposite to them, springs *L* are supported by posts M^1, M^2, M^3, M^4. When the armature swings to the left there is a circuit from battery *J* through a conductor to contact on the armature *N*; thence to spring *O*, to post M^1, by conductor *P*, to the binding post *Q*. Also the other side of the battery may be traced through conductor *R*, thence to central *S*, post M^2 and to binding post *T*. When the armature swings in the other direction, a slight inspection of the circuit shows, that the contact springs on the end of the armature reverses the polarity of the battery in reference to posts *Q* and *T*. If from these posts the circuit is carried to the switchboard and properly connected to the ringing keys of the operators at the various positions, each operator will be supplied with a current which pulsates to and fro as often as the arm swings, and by pressing her ringing key she can connect this alternating current with any subscriber's line which she may desire.

There are two other features in connection with the pole changer which are worthy of notice.

So long as no operator presses a ringing key it is evident that the circuit of battery *J* is entirely open, and consequently the battery is expending no energy, save that which is inevitably due to such local action as occurs in even the best forms of open circuit cells. When the ringing key is operated, the battery delivers energy only for the time that the key is down; and in order that each operator may be assured that she is properly ringing the subscriber, a vibrating bell or buzzer *U* may be introduced in the ringing circuit. This may be one bell for the entire exchange, or an individual one may be provided for each position.

Another noteworthy feature is the introduction of the condenser *V* and the relay *W*, to which slight reference has already been made. The object of the condenser is twofold. Whenever an electrical circuit is completed, a certain amount of energy is absorbed or stored up in apparatus with which the circuit is connected, and indeed about the actual conductor of which the circuit is composed. The more apparatus, such as relays, bells or other electrical appurtenances with which the circuit is loaded, the greater will be the energy which is absorbed by them. Now, if the circuit is suddenly opened, all of the energy which has thus been stored will be set free, and the result is likely to be a dangerous sparking at the point where the continuity of the conductor is broken. In the case of long transmission lines, operated at high potentials, the amount of energy which is set free may be enormous, sufficient to cause an arc of many feet in length, and adequate to puncture the strongest insulation which it is possible to build.

The same phenomena occurs in the case of the pole changer, although on a comparatively small scale. Yet this spark is sufficient to injure, in a relatively short time, the contact points, and thus destroy the usefulness of the apparatus. The object of the condenser is to prevent this sparking, for the condenser acts to the electrical circuit like the air reservoir upon a hydraulic ram or pump, for the condenser is simply a receptacle in which electricity can be stored, so when the armature swings away from the contact springs, the energy released by the rupture of the circuit finds an overflow in the condenser, and the charge on the line, rushing toward the point where the circuit has been ruptured, is enabled to escape into the condenser, and thus the disastrous sparking is prevented. If, however, the condenser were constantly left in the circuit, every time that the armature swung to and fro the battery would charge the condenser; consequently, with each pulsation, such a quantity of electricity would be wasted as could be absorbed by the condenser. To obviate this is the office of the relay *W*. So long as no ringing key is operated the ringing circuit is open and magnet *W* is not excited, and consequently contact *X* is open and the condenser is cut off. When the operator presses the ringing button, magnet *W* becomes excited and

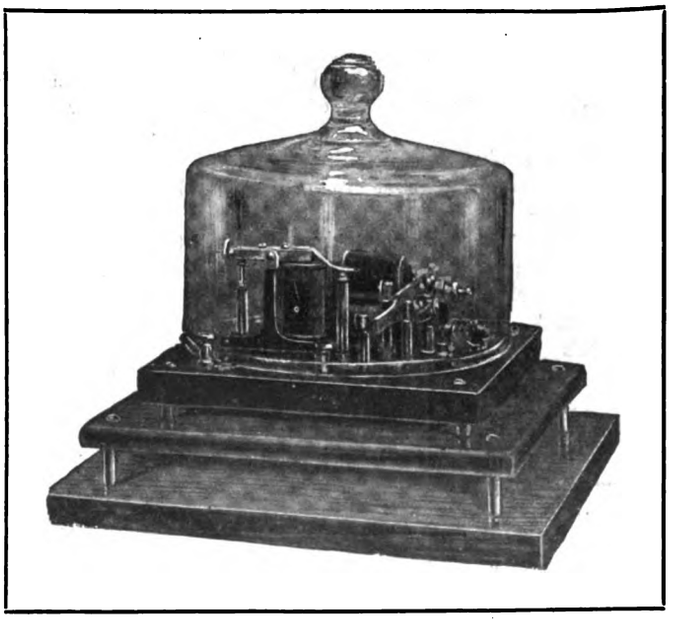

Fig. 3. The Warner Pole Changer on Base with Glass Cover.

the condenser is automatically bridged across the circuit, and in position to prevent the dangerous sparking at the armature terminals.

The complete apparatus of the pole changer is shown in Fig. 3. An oak base (not shown) forms a suitable receptacle into which the ringing battery, usually consisting of from 50 to 100 dry cells, may be placed. Six jacks are inserted into the base,

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and by means of a plug and cord it is easy to change the number of cells which are used for the ringing battery. Above the base a smaller cabinet is placed which is used as a receptacle for the operating battery. As this battery is in constant use, some type

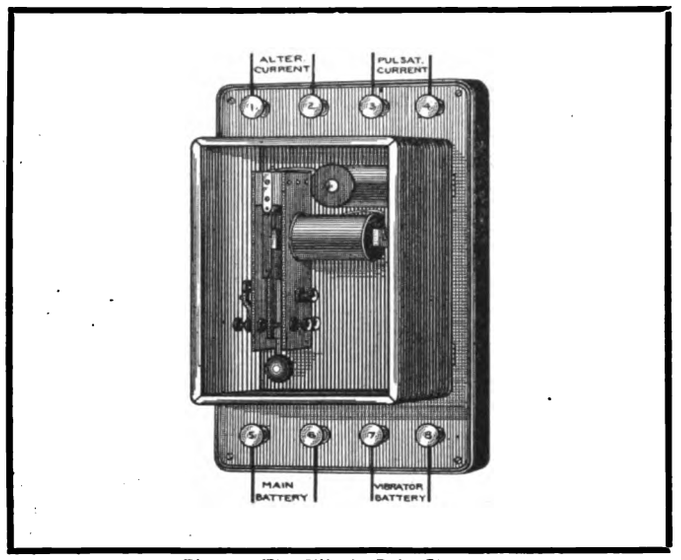

Fig. 4. The Illinois Pole Changer.

of closed circuit cell must be employed. Usually the Edison-Leland or the Gordon battery is selected. On the top of the second cabinet the apparatus of the pole changer (Fig. 3) is placed, carefully leveled, and protected by a glass case.

Another form of pole changer made by the Illinois Electric Specialty Company is shown in Fig. 4. This apparatus differs from the Warner chiefly in the arrangement of its mechanical details. Fig. 4 shows that the mechanism consists of an actuating magnet, the vibrating arm and contacts all secured on a base plate so arranged as to be bolted to a wall in such a manner that the arm may hang freely suspended, at liberty to vibrate under the impulses of the magnet. The circuit of this pole changer is shown in Fig. 5. A comparison of this diagram (Fig. 5) with that of Fig. 2 shows that the two circuits closely resemble each other. There are, however, two points of difference in the Warner pole changer. The condenser is connected to the circuit by means of relay apparatus at such times as pole presses ringing

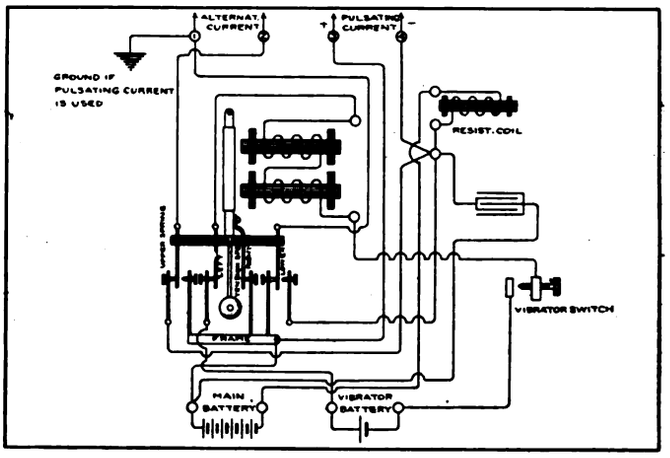

Fig. 5. Circuit Diagram of the Illinois Pole Changer.

key. In circuit of Fig. 5 the condenser constantly crosses the circuit and in addition the resistance coil is used to cut the current down. Both of these circuits can be arranged to supply pulsating current of either positive or negative quantities at pleasure by connecting the lead to the ringing key in such a manner that either positive or negative impulses are delivered to the proper key in question. As is shown in diagram this is accomplished by using either one side or the other of the circuit. These pieces of apparatus may be used either for straight magneto bells or for party line circuits and in economy of first cost and in cheapness of operation form probably the best devices at present known for signalling, in small exchanges.

A Home-Made Wire Chief's Desk

AT Albion, N. Y., in connection with the lockout system working there, there has been built and installed a wire chief's desk after which electricians in the smaller places may pattern.

Fig. 1 is a photograph of the apparatus. The table may be built of any suitable wood. In the instance illustrated oak was used. This makes a very satisfactory material, as it takes a beautiful finish and wears excellently. For a voltmeter one of the Pingolet make was used having a high and low scale. A standard wall set transmitter and an operator's receiver were utilized for the talking set. Fig. 2 is a detail drawing showing how the apparatus was arranged on the table.

Fig. 3 shows the strip of testing jacks into any one of which the plug associated with the apparatus in the table may be inserted. The first five jacks in the strip connect with conductors which run to the test plug. This is arranged so that it may be inserted in any one of the lines at the protector. The wire chief may test, on one insertion of the test plug, toward the switchboard, the line through the heat coils, the line direct (by means of these two latter tests he can tell immediately whether the heat coils are open or not), the tip heat coil and the sleeve heat coil.

The circuits shown with this article are so simple that reference to the method of operation is unnecessary and will enable any telephone man to build his own testing table. By a little study of the many clear articles on voltmeter testing which have appeared in this paper recently a student of the art can readily learn to effectively manipulate the apparatus.

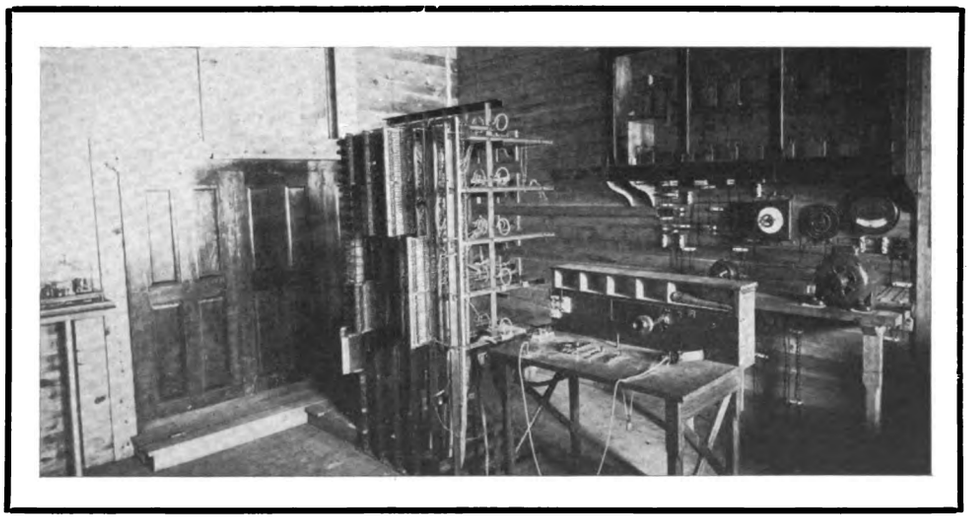

Fig. 1. Showing arrangement of wire chief's apparatus.

In Fig. 4 the wiring of the circuit keys is shown. Special attention is drawn to this

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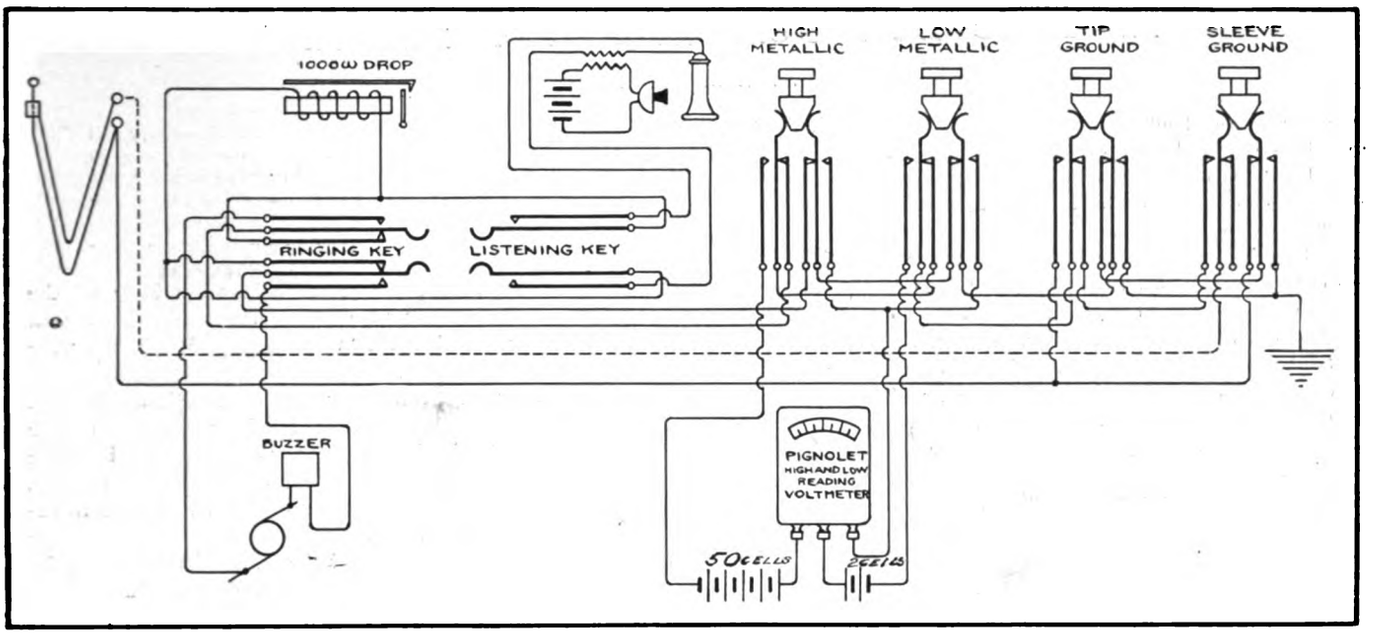

Fig. 4. Cord circuit of testing apparatus.

circuit, as it portrays a very simple method of connecting a high and low reading voltmeter in circuit by means of four buttons, which can be manipulated to test either side of the line at will.

The cost of the equipment at Albion, N. Y., was as follows:

Oak lumber dressed	$2.15
11 hours carpenter, at 30 cents	3.30
1 bank S. C. jacks (10)	5.00
2 1,000-ohm ex. bells at $3	6.00
1 F. B. Cook test plug to fit arrester equipment installed	1.50
10 ft. six-conductor silk cord	1.00
1 cord and plug to fit jacks	95
1 S. C. 4 part, list and ring key	3.50
1 ohm drop complete	3.00
1 high and low scale Pignolet volt meter	16.50
1 operator's receiver with cord plug and head band.	2.50
1 induction coil	.50
1. No. 22 2S. C. S. B. wire	.88
56 cells No. 6 dry battery at 16½ cents	9.24
1 lockout to lockout cord equipment (special to Albion switchboard)	13.50
20 hours expert's time assembling table	10.00
Incidentals	2.00
Total	$83.77

The following rules are observed at Albion:

1st. Every instrument as soon as unpacked is sent to the testing bench, where it is connected to the wire chief's table. The

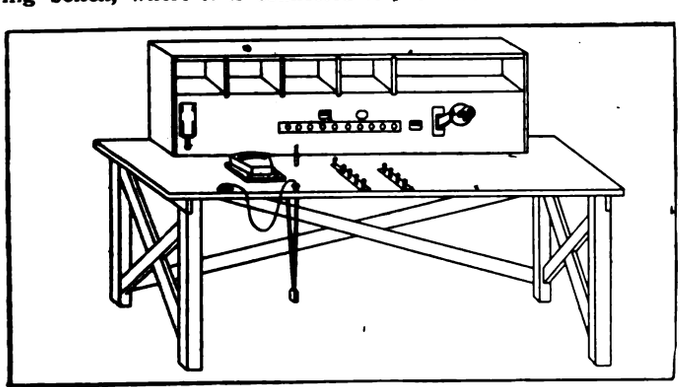

Fig. 2. Sketch of test table arrangement.

wire chief's O. K. is necessary before it will be accepted in the instrument store room.

Any defects are thus quickly located and rejections are promptly made if the fault is up to the manufacturers.

2d. Every case of trouble noted by or reported to the operators is filled out on a trouble ticket by the chief operator and sent to the wire chief's desk, where the nature of the trouble and its location is accurately determined and noted thereon, as well as recorded in the trouble record. Trouble repairmen are under

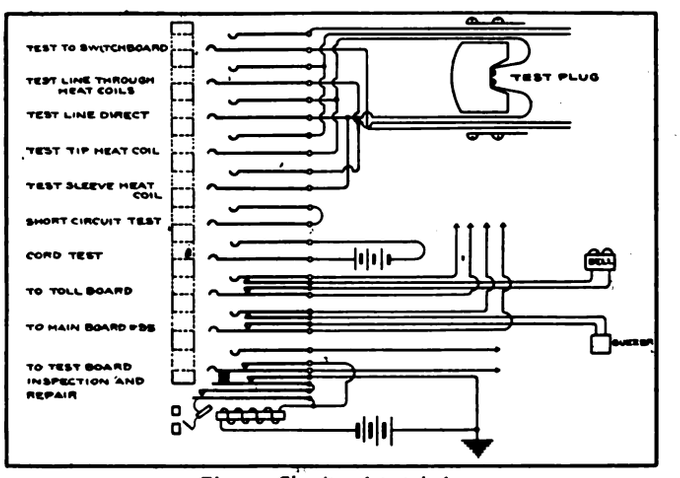

Fig. 3. Circuits of test jacks.

charge of the wire chief's desk and the ticket is O. K. after the wire chief has tested the repair.

3d. All new lines are measured for line conductivity and insulation, and notes of the same are recorded in the equipment book for future reference.

A NEW INSULATING SUBSTANCE TO BE MADE FROM MILK.

IN a recent issue of the *Elektrotechnische Zeitschrift* there appears a description of a new insulating material known as galalith. It is prepared from skim milk by a process on the whole similar to that employed in the production of ebonite. The result is a material having a structure which also resembles that of ebonite or horn. Water is first removed from the skim milk, the resulting product being hardened and then treated with certain acids, the material thus obtained being plastic. It is next pressed by hydraulic power into definite shapes and it is finally treated in a drying stove. Galalith is said to be from about 28 to 30 per cent. more elastic than ebonite and is easily machined. Its density is about 1.4.

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A Little Bell Deal That Went Astray

By Antonio West.

"THE best laid plans of mice and men aft gang aglee." So said Robert Burns, and it is reasonable to suppose that the officials of the Southern Bell Telephone Company will concur in the statement. It is a sad story, and one which, under ordinary circumstances, should be accompanied by some tears of regret.

Down in Mobile, Ala., an Independent Company, the Home, has been established for ten years. Like lots of other Independent companies, it had been started at a time when development, from an engineering standpoint, had not been well advanced. Nevertheless, it had pleased its subscribers, and kept the even tenor of its way. Finally, there came a time when it became necessary to re-equip the plant. This was the opportunity of the gentlemen who control the Southern Bell, or at least they thought it was. Its emissaries were sent to the stockholders of the Home Company, and to each one a little story was told, which ran something like this: Gentlemen, we are philanthrophists; we very much hate to see you throw away your money; we dislike very much to have business men of your financial standing mix up in a proposition that does not appear to us to be financially sound; and what is more we have discovered that there is not all the harmony that should exist in your camp. We are of the firm opinion that this dissatisfaction will spread to such an extent that you will no longer be able to maintain the business relations with your subscribers that you would like.

By the persistent spreading of gossip of this kind, a schism was created between the officers and directors of the Home Company. Then, at the psychological moment, a suggestion was made to the stockholders that the whole trouble could be settled in a very comfortable manner. The public spirited gentlemen of the Southern Bell would buy the Home equipment. This suggestion fell on fertile ground, and, accordingly arrangements were made. An "agreement" showing the fine Italian hand of the Bell in every line was drawn up. As part of this "agreement" there was a resolution by the Home stockholders as follows:

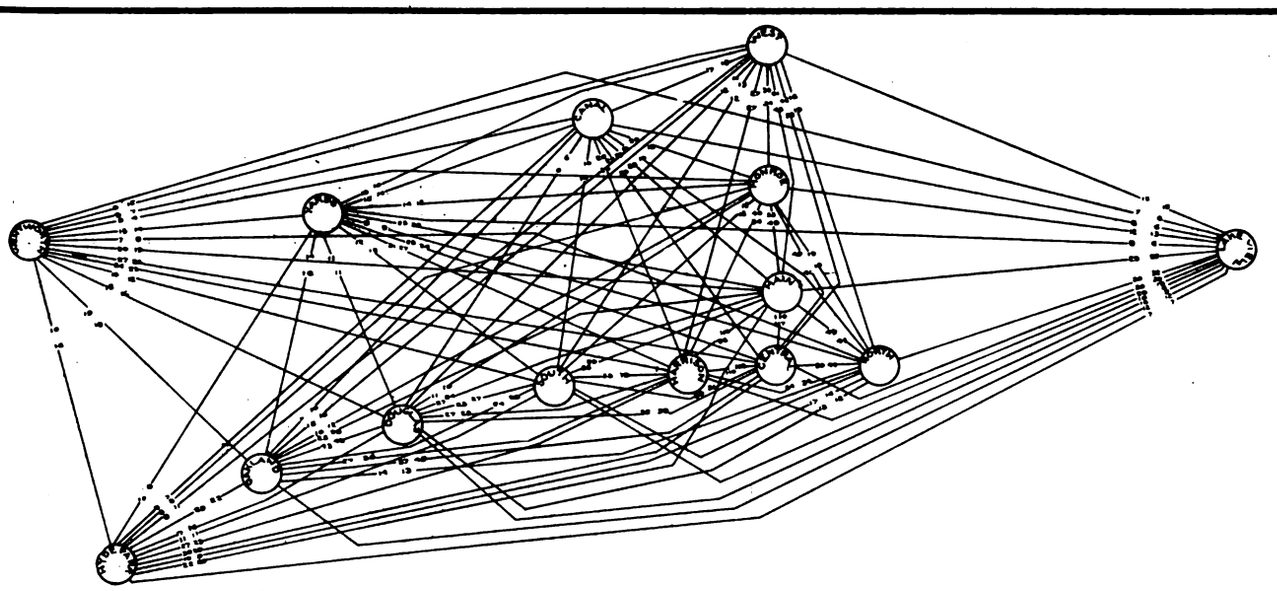
> *Resolved* by the stockholders of the Home Company ——— that, inasmuch as the said company, after being in business for more than ten years, has been unable to profitably operate its property ——— and it will continue to be unprofitable, the best interests of the stockholders will be subserved by the discontinuance of its business and by its going into liquidation.
>
> *Resolved*, That every director and officer of said company will hereby authorize the directors to at once proceed to take all necessary steps to carry this resolution into full effect; and
>
> *Resolved*, further, that the officers and directors of this company are authorized to present a petition to the Mayor and General Council of the City of Mobile, surrendering to that city all its rights and franchises.

These resolutions were made part of the main body of the "agreement," this instrument then proceeding to set forth that the Southern Bell would buy the "worthless" plant of the Home Company for $45,000 in cash.

So much for the agreement. Now comes the rude awakening. One, Mr. F. R. Bryant, who erstwhile had been manager of the Home Company, but who had apparently not been let into the mysteries of the agreement between the Bell and his company, became aware that there was something doing, and that it behoved him to put on his felt slippers and do a little detective work of his own. After getting all the facts of the matter, he at once got into communication with Mr. Edward L. Barber, who built Louisville, Kansas City and other big places. This gentleman commenced negotiations and bought some stock, and agreed to buy the whole company. The Bell Company had arranged that the payment of the $45,000 should be made at twelve o'clock, noon, on the 19th of April. There was unconcealed glee in the Bell camp. Were they not going to have a free hand for twenty years to soak the people what they liked for telephone service. Had they not won another of their glorious fights and proved that the mighty Bell was master of all it surveyed? But events transpired and painful events for the Bell. When its agents produced its covenants and agreements, and cold hard cash, matters had been so manipulated by Mr. Barber and Mr. Bryant, that it was ten minutes after the appointed hour. It was pointed out to the Bell people that the option had expired ten minutes before and that the deal was all off. Of course there was blustering and threatening, but the Home officials stood pat. A formal transfer of all the stock was made to Mr. Barber and his associates who are now in control of the property.

It is their intention to rebuild the plant, and branch out and secure other towns in Alabama and thus soundly establish the Independent telephone industry throughout the State.

And that was the end of a typical Bell coup.



CHICAGO TRUNK CIRCUIT DIAGRAM.

Diagram showing trunk circuits between the central offices of the Chicago Telephone Company. The small figures indicate the number of circuits into the exchanges at which the lines terminate.

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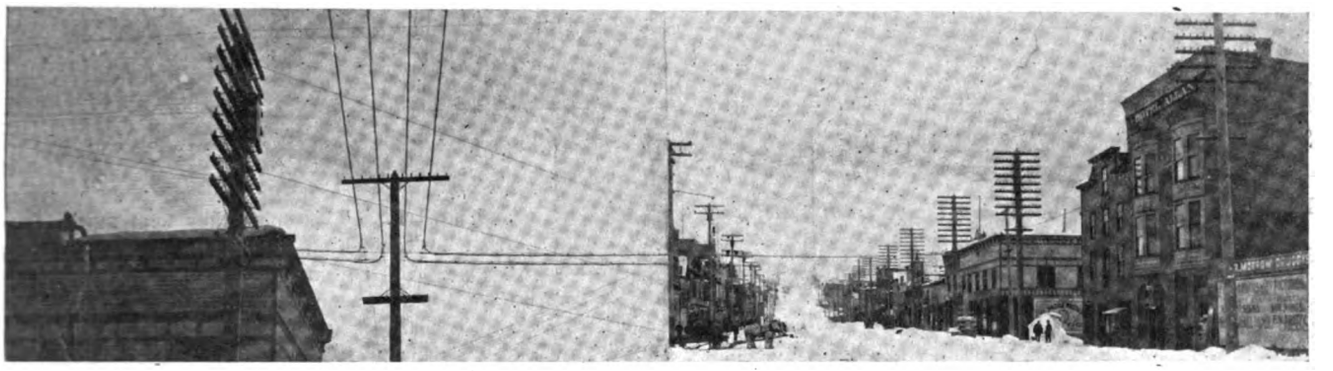
SOME BRITISH COLUMBIAN TELEPHONE CONSTRUCTION.

Columbia Ave., Rossland, B. C., showing the excellent pole line construction of the British Columbia Telephone Company. At the left is shown the method that the company uses for turning aerial cables on messenger wires.



The New Equipment for the Kinloch Company

By R. C. Clark.

No more decisive proof of the rapid development in switchboard design can be had than the recent order placed with the Stromberg-Carlson Tel. Mfg. Co., by the Kinloch Telephone Company, of St. Louis, for a new central energy multiple switchboard, to have an ultimate capacity of 17,000 lines, of which the present equipment will be for 12,500 circuits. At the time the equipment now giving service was installed, it marked a new departure in switchboard design and was the then highest type of such apparatus in the world. No one could foresee that its days of usefulness were to be so short, and that the branch of development of which it was representative, should so soon be discarded.

Briefly described, the present board at St. Louis is termed a divided multiple. To enable a large number of lines to centre at one exchange, the multiple is divided into four sections and the line lamps and answering jacks multipled four times. In operation, if a subscriber wishes a number in any section, he pushes a button associated with that division, which causes his line lamp to glow at that point and at no other. This feature, from the operating standpoint, had several good points at the time it was devised, as then the art of jack design had not progressed to the point where it was possible to crowd into so small a space the number of jacks as is now general practice. On the other hand, it requires the subscriber to perform a duty which modern practise has shown us is impractical. Mistakes will occur in getting the right section of multiple and this places an unnecessary drag upon the service. The new equipment will be the regular multiple type with *A* and *B* boards, each equipped with four party ringing keys throughout. The *A* board will consist for the present of thirty-seven sections, each equipped with a multiple of 12,500 subscribers' lines and 420 outgoing trunk lines. The answering jack equipment will consist of 14,680 jacks and associated line lamps, which will require the services of 111 *A* operators upon a basis of three operators to a section. The *B* or incoming trunk board is to have a present equipment of ten sections, each requiring the services of two operators with 27 trunks per position. Besides the above there will be three monitors' sections of two operators positions each, one observation desk with four operators positions, one combination manager's and assistant manager's desk, and one combination chief and assistant chief operator's desk. An entirely new power plant will be installed, which will include duplicate sets of storage batteries, charging motor generators and ringing machines; together with the necessary power and fuse boards.

The incoming lines will follow the general practice and terminate at a main distributing frame, and be cross connected at an intermediate frame. The main frame will carry protective devices and be located, together with the intermediate frame and relay rack in the terminal room. For testing purposes a wire chief's desk with four positions will be installed.

The Kinloch Telephone Company is one of the most progressive Independent companies in the country. Its directors and officers are representative of the best business interests of the city, and constitute one of the strongest executive organizations in the country. The following is a list of the Kinloch Company's officers: S. M. Kennard, president; W. F. Nolker, first vice-president; William D. Orthwein, second vice-president; Charles H. Ledlie, third vice-president; H. Linton Reber, secretary and general manager; H. G. Fadeley, treasurer. These gentlemen, with the exception of the secretary and treasurer, together with Adolphus Busch, C. M. Forster, August Gehner, Breckenridge Jones, William J. Lemp, Jr., Henry Nicolaus, Phillip Stock and Julius S. Walsh, constitute the board of directors.

The company is erecting a fine modern building. The sixth floor will be given up to the main switchboards. On the fifth floor will be located the toll board of the Kinloch Long Distance Telephone Company, of Missouri, together with the distributing frames, relay racks and wire chief's room. The balance of the building will be occupied by offices.

The new switchboard will be the largest equipment ever undertaken by any manufacturer, and when completed will be the largest switchboard in the world. The switchboard in Vienna, Austria, which is now complete to its full capacity has 12,000 lines. It was not, however, put in as one installation, but has been added to at different times. The switchboards approaching nearest to the St. Louis equipment in size, are the ones in Buda Pest, Hungary, and St. Petersburg, Russia, each of which were equipped for 10,000 lines. No pains will be spared to make the new St. Louis equipment the finest in the world, and one which will add one more triumph to the Independent field of telephone engineering.

LOUIS HOLLWEG ELECTED TO OFFICES MADE VACANT BY DEATH OF S. P. SHEERIN.

At a meeting of the directors of the New Telephone Companies, of Indianapolis, both local and long distance, Louis Hollweg was elected president of both companies to fill the vacancy caused by the death of Simon P. Sheerin. H. B. Sale was elected vice-president and general manager of the local company. A. F. Ramsey was elected vice-president of the New Long Distance Telephone Company, and H. B. Sale was elected secretary and general manager.

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A SIGNIFICANT DEAL IN ST. LOUIS.

ON another page we are publishing the facts in connection with the proposed installation of the new switchboard of the Kinloch Telephone Company, at St. Louis. As set forth, this switchboard will be the largest in the world. It will mark an interesting period in the operating field, and it's installation is certain to be eagerly watched by every telephone engineer, not alone in America, but throughout the world. However, the chief interest attaching to this great piece of work does not lie on the technical side. Whatever its construction may mean to the telephone engineer, it means vastly more to the telephone manager, and especially to the telephone financier.

The Kinloch Telephone Company was the first big Independent concern to take the field in opposition to the Bell monopoly. The formation of this company was the outgrowth of the usual conditions that prevailed under Bell domination. Exasperated by outrageous charges, by wretched service, and a total disregard of the public's welfare, a group of St. Louis business men were induced to enter the opposition telephone field. They were not inspired particularly by the desire for money making, but rather by the desire to correct a crying public evil. In fact, the financial side of the matter was not at all alluring to them; they were rather prepared to meet an annual deficit, in order to obtain courteous treatment and some sort of efficient service. To their amazement, after the service was installed and put in operation, the system proved not alone successful from the standpoint of the public, but entirely successful as a business investment. From the very start almost its stock paid good dividends, and its bonds became a standard of value in the St. Louis market. And this despite the conceded fact that, from an engineering standpoint, the system was almost crude.

With Cleveland, it was the first large board that was put in by the Independents. It was built by the Kellogg Switchboard & Supply Company, and was of the divided multiple type, which, as every telephone man now concedes, was a mistake both from a technical and commercial standpoint. Notwithstanding this incubus, and notwithstanding the fact that in later years it has been practically necessary to keep almost as many people behind the switchboard as in front of it, in order to give any sort of service, the Kinloch Company prospered, as already set forth. No better test of the soundness of the enterprise, from a financial standpoint, can be asked than the condition of its securities during the times of depression. In 1902, when all securities were wild and selling off, the Kinloch bonds alone held their own in the St. Louis market, and found a ready sale at all times, with comparatively little loss in value. So sound an impression did this condition make on the St. Louis capitalists that they eagerly sought Independent investments elsewhere, until now St. Louis capital controls the Kansas City Company, and is a large factor in a number of other of the most important Independent concerns in the middle west.

There was something beside mere management to account for the steadiness of the Kinloch Company, both as a moneymaker and a successful public enterprise. This was the spirit of the men in control. As stated above, their prime motive in entering the telephone field was to vindicate their rights as American citizens and to make it clear that they would not tamely submit to arbitrary domination by any concern, no matter how large and powerful. This spirit they kept at the fore front in conducting the affairs of the Kinloch Company. It dominates the concern as much today as it did at any time. It was this spirit that made it possible to keep the company going, when it was handicapped by wretched apparatus. And it is this spirit to which we wish to call attention at present, and which is the significant thing in the improvement now under way. It had been the general impression that, when the time came for the replacing of the switchboard, the contract would go as had the first contract, to the Kellogg Company. And so it would have gone under, ordinary circumstances, we are advised. But, in pursuance of the policy of absolute Independence, it was deemed by the directors unadvisable to give the contract for the new board to the Kellogg concern, for the reason that this company, as is well known, is now controlled and dominated by Bell interests. It was held that, in justice to themselves and to the people of St. Louis, the directors could not afford to go for equipment to a concern which, like the Kellogg, is simply a branch of the Western Electric Company. It was not a question of price, but a question of Independence. It was not a commercial question at all, but a question of sentiment and square dealing. It was a question of upholding Independent ideas along every line. And for the broad view that these gentlemen have taken in the matter they deserve the thanks of every man in the Independent field.

WHY THE KINLOCH CAST OUT THE KELLOGG.

PROBLEMS OF SIMULTANEOUS WORKING.

ONE of the most interesting and valuable papers read before the recent National-Interstate convention, dealt with the subject of composite circuits. The cry has often arisen that telephone lines were unrenumerative, in proportion to their cost of construction and maintenance, because they are idle a greater part of the time. As was ably pointed out by the speaker, there are opportunities for private line telegraph business, which in many cases would repay a good profit, not only upon the additional equipment necessary for its equipment, but also upon the line itself. There is hardly a city in any part of the country where there are not firms who would appreciate the opportunities of private telegraph service. In fact, in some cases telegraph service is preferred to telphone. When a telegram is sent, a record of the message is kept, which, if necessary, can be referred to at any time, but with a telephone message, being oral, there is no way to verify statements, except a written record is kept, which, to say the least, is unlikely. When the office of a concern is in the city and its works out in the country, numerous occasions arise during the day when messages are transmitted between them, which it is of vital importance should be received correctly. The best telephone apparatus in the world may fail at times to reproduce certain sounds correctly, and in consequence the wrong construction can easily be placed upon sentences, which will mean losses in varying degrees of magnitude. A private telegraph system would preclude the possibility of error, since the message could easily be repeated for verification.

The reason that composite telephone-telegraph circuit operation has not become more general is due, not only to the lack of knowledge upon the subject, but also to the limitations of its present development, which it places upon a line, and which are at present unsolved problems.

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The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

FEDERAL RULE AS TO TREE TRIMMING.

What is the rule of the United States courts as to the right of a telephone company to trim trees adjoining its lines of wire? Y. K.

WHERE a telephone company, authorized to erect poles and stretch wires through the streets of a city was required, by ordinance, to move its poles and wires from a street to an adjoining sidewalk, and in so doing trimmed trees only so much as was necessary under the direction of a city officer, it was held by the United States Court of Appeals that the company was not liable in an action of trespass to the owner of the trees. Southern Bell Telephone Company vs. Constantine, 61 Fed., 61; 9 C. C. A., 359; 23 U. S. App., 56.

POWER TO COMPEL THE LAYING OF WIRES UNDERGROUND.

Has a city the authority to compel telephone companies to lay their wires underground where they have been strung overhead for years and it does not appear that the old system is unsatisfactory or dangerous to the public? C. L. R.

UNDER the general power conferred by a city charter to control and regulate the use of streets, it has been declared by the Missouri Supreme Court that the city had power to require as a police regulation that all electrical wires used for the benefit of the public shall be laid underground. In the case which established this rule the city had granted to a corporation the privilege of constructing and maintaining subways for a period of fifty years. It was held, however, that the grant was illegal, since it operated to confer a franchise for the use of streets for private purposes, and delegated the control over such subways to the corporation, and to this extent the city divested itself of the control and regulation of the streets, conferred upon it by its charter and which it alone could exercise. State v. Murphy, 134 Mo. 548, 34 S. W. 51.

NAME AND ADDRESS WANTED.

Within the last month the writer noticed in one of the electrical or telephone magazines an account of a suit entered by a telephone company against a company which had constructed a line and was operating some high tension wires paralleling the lines of the telephone company. Desiring to correspond with this telephone company, I am not able to locate the article referred to. Can you advise, giving name and address of telephone company entering suit? N. S. P.

THE case to which you refer is probably that of the Northern Telephone Company vs. Iowa Telephone Company, 98 N. W. 113. The Northern Telephone Company is located at Fonda, Pocahantas County, Iowa.

THE RIGHT TO CUT DOWN TREES ON EDGE OF SIDEWALKS.

ONE B. C. Brown, of Asheville, North Carolina, owned a lot, his title extending to the center of the adjacent street. The city, under its power of eminent domain, had condemned enough of the land to serve as a street. Later the Asheville Electric Light Company, with the permission of the Superintendent of Streets, afterwards approved by the board of aldermen, removed one of Mr. Brown's trees that stood on the outer edge of the sidewalk. The city had the power by its charter to control streets and sidewalks and to remove necessary obstructions. Brown sued the Electric Light Company for the destruction of his tree and the jury gave him a verdict for $499. The case having been appealed to the Supreme Court of North Carolina, the court held that when the city condemned land for a street it did not acquire title to the land, but merely a right of way over it, so that the plaintiff was still the owner of the tree. The authority given the city to permit the erection of poles and wires over the street, merely authorized the city to grant franchises, subject to the rights of abutting owners, and an electric light company appropriating any rights of such owner must make compensation. It therefore follows that trees standing on the edge of the sidewalk could not be cut down by an electric company without compensating the owner. Before the company could acquire the right to cut a tree it must show that such cutting was necessary, the mere convenience of removing the tree in erecting poles and wires not being enough to justify it in making the removal. Brown v. Asheville Electric Light Company, 51 S., 62.

COMPANY'S DUTY TOWARD SUB-CONTRACTOR'S EMPLOYEE.

THE United States Gas and Electric Company, of Dover, New Hampshire, was building a power house, an Independent contractor carrying on the work. A staging for use in erecting the walls had been built outside the walls and within a short distance of the company's electric wires. A workman handling boards upon the staging slipped on some snow or ice and fell against the wires, being badly burned and dropping to the ground. The insulation was worn off the wires and they were bare in places. The workman sued the company for damages. The company contended that the workman had assumed the risk of falling against the wires as a part of the contract of his employment. Upon the case coming to the Supreme Court of New Hampshire, it was held that the risk was not assumed by the workman, because the fact of actual or constructive knowledge of the danger upon the part of the plaintiff while on the staging, must be considered as having been invited there by the defendant company, and that the defendant therefore owed to him the duty, which could not be delegated, to use reasonable care to protect him from the danger occasioned by the maintenance of a high voltage of electricity. Stevens v. United Gas & Electric Co. 60 Atlantic 848.

CONTRACT VOID FOR WANT OF MUTUALITY.

THE Co-operative Telephone Company, of Detroit, Michigan, brought suit against Peter Katus to recover two contracts in writing, signed by the defendant. The contracts, which were almost identical in form, amounted to a subscription for one $50 share of the capital stock of the company, to be paid for in monthly installments of ten dollars each, and also included an agreement to rent a businesss telephone for the period of three years in one case, and a residence telephone for the same period in the other. The contracts were made subject to section 2 of article 1 of the by-laws of the company, which provided that every subscription to stock must also embody a contract for the rent of at least one telephone at the current rate, for the term of at least three years. The contracts were not signed by the company and the defendant contended that for that reason they lacked mutuality and were therefore void. The court held that each contract must be considered in its entirety, and that the clause in the contract which contains the subscription for stock, could not be said to be a separate and independent agreement upon which the defendant could be held liable. It therefore decided that the company could not recover against the defendant. Co-operative Telephone Co. v. Katus, 103 N. W. 815.

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IN THE OPERATING FIELD.

INDEPENDENT COMPANY APPLIES FOR A FRANCHISE IN SAN FRANCISCO.

SAN FRANCISCO, CAL., is to have its Independent plant. The San Francisco Home Telephone Company, by Mark L. Gerstle, president, has filed a petition with the Board of Supervisors that it be granted a franchise to construct and operate a telephone system in San Francisco. Accompanying the petition is the draft of an ordinance providing for the sale of the franchise, which is to run for fifty years. The terms and conditions under which the franchise is to be granted are as follows:

"That the company shall within four months from the date of the grant commence in good faith the work of installing the system.

"That $2,000,000 shall be expended within twelve months, $3,000,000 within twenty-four months and $4,000,000 within thirty-six months after the commencement of the work, which is to be completed in three years or the franchise shall be forfeited.

"That the grantee shall furnish free of charge to the city 100 telephones; shall pay 2 per cent. of its gross receipts to the city, provided that no such percentage shall be paid for the first five years; shall furnish a bond of $250,000 for the observance of the conditions of the franchise.

"That the grantee shall not without the consent of the city sell or transfer its property to any other telephone corporation."

The ordinance provides for the receiving of sealed bids for the franchise on a date to be fixed later. There appears to be but slight doubt in the minds of those that are in a position to know that the franchise will be granted and that San Francisco will be added to the already generous list of Pacific coast Independent cities.

HARRISBURG (PA.) MAYOR ISSUES ORDER COMPELLING PAINTING OF POLES.

MAYOR GROSS, of Harrisburg, Pa., has signed a councilmanic resolution directing the highway commissioner to enforce an old law prescribing that all poles in the city be painted. A year ago all companies owning poles were ordered to paint them and mark them with the initials of the company and give each a separate number for identification. Some did and some did not and the matter lapsed with a change in the municipal government. The United Telephone and Telegraph Company had all of its poles attended to last year, but a dozen new ones, since erected, had to be painted under the new order. All other companies were also compelled to attend to this matter and the work is now going on.

LONG ISLAND RAILROAD TO HAVE ELABORATE PRIVATE SYSTEM.

A PRIVATE telephone system is being installed, it is reported, along the western end of the Long Island Railroad which will, when completed and in operation, put practically every yard of fifty miles of track within earshot of the track superintendent in his office in Long Island City. Telephones will be placed along the tracks within less than a half mile of each other, in a manner somewhat similar to that used in installing the patrol boxes, in use by city police departments. There will be about 150 of these telephones at the eastern end of the road. Of this 150 about 100 will be placed along the tracks, while the other fifty will be installed in signal houses and stations. Crews of road inspectors will travel constantly over the various lines in novel railroad automobiles to keep a sharp lookout for obstructions or breaks. Each crew will consist of four experienced railroad men and electricians who will travel prepared for any emergency. When on the road the crews will keep in touch with headquarters by telephone, and can always be summoned for emergency work. The railroad automobiles can travel at thirty miles an hour. They will weigh 750 pounds, and will carry complete kits of necessary tools.

CUYAHOGA TELEPHONE COMPANY EQUIPS ITS TROUBLE MEN WITH BICYCLES.

THE Cuyahoga Telephone Company, at Cleveland, Ohio, has introduced the use of bicycles for the use of the trouble and emergency men. General Manager French is greatly pleased with the results. He says it has given him a very much more effective service, has saved a vast amount of time and is so much better than the use of the trolley cars that he intends to maintain the service.

HOW THE NATIONAL TELEPHONE AND ELECTRIC CO. OF FARMER CITY, ILL., GREW.

THE story of the National Telephone and Electric Company, of Farmer City, Ill., is an interesting and typical one. About seven years ago B. F. Wasson tried to interest the people of Farmer City in a telephone exchange. This company was called the Citizens' Telephone Company, but owing to the laws of the state it was not allowed to incorporate under this name. It incorporated under the name of the Farm and City Telephone Company and started a plant with twenty-two subscribers. Forty-four were on the waiting list before the switchboard was installed. The exchange has grown from this number to something like 2,500, of which about 400 are in and about Farmer City.

When the plant was first built some of the farmers made the statement that Mr. Wasson was crazy for trying to interest them in putting in country telephones, and now, Mr. Wasson says, they say he is crazy because he cannot keep up with the orders. There were two partners at the start, but they disposed of their interests to Mr. Wasson, and after he incorporated, another partner bought a half interest, which he kept until November 15, 1904, at which time he sold his interest to a Mr. S. H. Martin. The company at this time was reorganized and reincorporated, and is now known as the National Telephone and Electric Company. It has sixty people working for it filling orders, installing cables and putting in new switchboards. The salary roll is about $25,000 a year.

The company has nine exchanges, thirty-seven toll stations, 3,500 miles of wire and about 2,500 telephones. There are orders on its books for 500 additional, which will be installed as fast as the company's resources will allow. Mr. Wasson is the president of the company, and Mr. S. H. Martin secretary and treasurer. The third new switchboard is at present being installed in Farmer City. There is 6,000 feet of cable in use, and it is expected that the new switchboard will be working with full metallic circuits by early in July. There is being installed 10,000 feet of 100-pair cable in Clinton, Ill., and another section will

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Advertisements under this head, $1.00 for 25 words or less for each insertion. Prepaid.

FOR SALE—Small exchange in Cambridge, Wis. Well paying, modern and up-to-date. Address Prof. G. W. Wilder, Armour Institute of Techonology, Chicago, Ill. 403

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FOR SALE—Two-fifths (2-5) interest in good paying telephone plant west of Missouri River. Position of manager goes with sale. Ten thousand dollars ($10,000) to hand deal. Address Box 405, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 405

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SUPPLIES WANTED—100,000 feet Twist pair, No. 14 gauge, H. D. Copper Wire. One conductor to be rubber covered. State lowest net price. Address Electric Supply and Construction Company, 407 Fourth avenue, Pittsburg, Pa. 407

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WANTED—Men who have local lines in their charge to act as agents for our patent insulators. Send for circulars, sample and price. It will pay you. Address Claydon & Sons, Tabor, Texas. 386

WANTED—Every telephone man to send us your switchboard apparatus and instrument repair work. Coil winding a specialty. Our prices are low. We return work promptly. Address Jester & Millikan, Marion, Ind. 387

WANTED—First class, experienced man as telephone and switchboard inspector. Must be familiar with telephone circuits. State age, experience and salary expected. Address, Box 402, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 402

POSITION WANTED as salesman by a practical telephone man with ability and sales experience. A hustler on missionary work. West preferred. Able to make friends and keep them. Address Box 380, THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 380

WANTED—Opening in town of 1,000 or more to install telephone system, or will buy some stock in medium sized company and manage same. References furnished. Address Box 408, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 408

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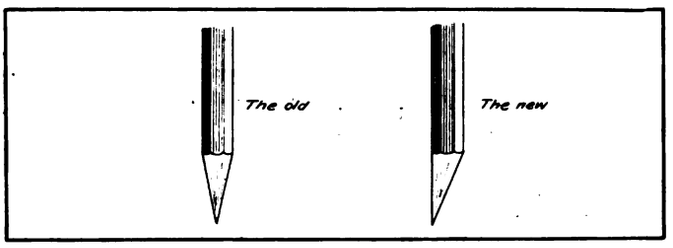
soon be installed there, giving the plant a capacity of 700 subscribers.

At the time the Clinton exchange was purchased three years ago of J. D. Rogers, the company had 195 telephones, and to-day, after three years, it has 600. Mr. Wasson has practically covered the principal part of DeWitt County and Piatt County with telephones, and has several lines in four other counties. The National Company connects with the Interstate Telephone Company's lines, which gives long distance connection to 150,000 subscribers.

BEST WAY TO SHARPEN DIGGING BARS.

HERE is a suggestion to construction men about sharpening digging bars. "The old way," says a construction foreman (and it is the way now used in most cases) "is to gve the point a double bevel like a chopping or cold chisel, and in hard or gravelly soil it is a hard job to get the hole diggers using this bar to keep their holes as large at the bottom as they are started at the top. I am sure many of our construction foremen will agree to this. I had so much trouble along this line that I looked about for a plan



to relieve the situation a little if not entirely, and fell upon the plan of having the bar beveled all on one side and the other side straight like a wood chisel. I only had a few of them fixed this way and sent them out to the men without saying anything to them, just to see if there really was any difference; on the second day I came upon four of the men at noon and they were having a heated argument about who was to use the new pointed bars; upon inquiry I found that the men using the new points had gained two holes on the others during the forenoon. I had all the bars sharpened in this way and found that I was almost relieved of the trouble of funneled holes."

INDEPENDENT FRANCHISE APPLIED FOR IN VALLEJO, CAL.

AT a meeting of the City Board of Trustees of Vallejo, Cal., held recently, Attorney Frank R. Devlin, of San Francisco, filed a petition asking that the board advertise the sale of a franchise to maintain through the streets of that city for the period of fifty years a telephone system. The petition went over until the next meeting in order to allow the City Attorney to look into the law in the matter. Devlin refused to disclose his plans, but says that the new company will install a system on the lines of the new "Home" telephone systems operating in various other California cities.

It is believed the new $4,000,000 incorporated company, composed of the most prominent capitalists in San Francisco, is behind Devlin and intends to build in cities other than San Francisco. The Pacific States Telephone Company is preparing to meet the new line by spending nearly $20,000 to entirely rebuild the Vallejo system.

UNUSUAL FRANCHISE STIPULATIONS IMPOSED ON POTTSVILLE, PA., COMPANY.

A RATHER unusual point in a franchise was brought out at Pottsville, Pa., recently. The Union Telephone and Telegraph Company applied for an extension of its franchise. The discussion over the various sections of the measure was very thorough and a number of specific conditions were imposed upon the company. The company must carry all wires in a cable on any street where more than 11 wires are used. The reason "11" wires were specified is that a trunk wire (country ground circuit) cannot be carried in a cable because it would make it noisy, probably injuring the system. It was therefore concluded to allow the company to operate five pairs of local wires and a trunk wire on one pole line. The company is to maintain a set of instruments in each fire house and one set at the borough building, and in no case are there to be more than two telephones on any line without selective ringing apparatus, or more than four telephones on any one line with selective ringing apparatus.

CALL FOR SPECIAL MEETING OF THE INDIANA MUTUAL TELEPHONE STATE ASSOCIATION.

THE Indiana Mutual Telephone State Association has sent out a call for a meeting to be held at Winona (Warsaw) on Wednesday, July 12, 1905. This meeting is for the purpose of consultation, organization, concentration, and, if necessary, for the combination of the Independent telephone interests of the State. Recent events in which the Bell has taken part, make it necessary that concerted action should be taken at once. Theodore Thorwards points out, that the business of the Bell is not to purchase the entire number of Independent enxchanges, but to get hold of only enough to break down the strong connecting chain which is now established, and then will pursue its familiar tactics of cutting rates at the points which are not in its control. Winona has been selected as the place of conference because of its accessibility and low railroad excursion rates. It is therefore hoped that as many as possible of the members and friends of the association will be present to enable a comprehensive plan of action being decided upon.

NEW STATE TELEPHONE COMPANY OF SIOUX CITY, IA., ABSORBS MONONA COMPANY.

AN important deal in the Independent telephone situation in Northwestern Iowa has just been concluded which involves the absorption of all the toll lines, rural lines and local exchanges belonging to the Monona Telephone Company, of Onawa, by the new State Telephone Company, of Sioux City. This is a million dollar corporation recently formed to conduct the toll business in connection with the new telephone system being installed in Sioux City, the service for which will be ready in a month.

The stockholders of the Monona Telephone Company accept $60,000 worth of stock in the New State Company. Sixteen towns are in the list. The New State Company now owns all of the Independent telephone lines and local exchanges within a radius of fifty miles of Sioux City, including 15,000 telephones in all. Copper trunk lines are being build to Le Mars, Correctionville, Sioux Falls, Yankton and Fremont, Neb.

INDEPENDENT TELEPHONE COMPANY TO INSTALL A FIRE ALARM SYSTEM.

THE Village Board of Trustees, of Clifton Springs, N. Y., has granted the Inter-Ocean Telephone and Telegraph Company the right to install telephone cables, wires and other equipments necessary for telephone purposes, upon the electric light poles in this village. The telephone company agrees to install a fire alarm system in the village, consisting of six fire alarm telephones in iron boxes, and one eighteen-inch gong, all connected with the local switchboard, the telephones and gong to be located at such points as may be designated by the Board of Trustees, and to be used for fire alarm and police purposes only.

LONG DISTANCE PAY STATION SIGN ADOPTED BY THE CONVENTION.

THE new sign is the red, white and blue shield in use already to a large extent. It consists of white stars on blue background and alternate red and white stripes. This will be used as a general emblem; each company has the privilege of using lettering suitable to its conditions and name.

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ELECTRIC BUILDING
CLEVELAND, OHIO

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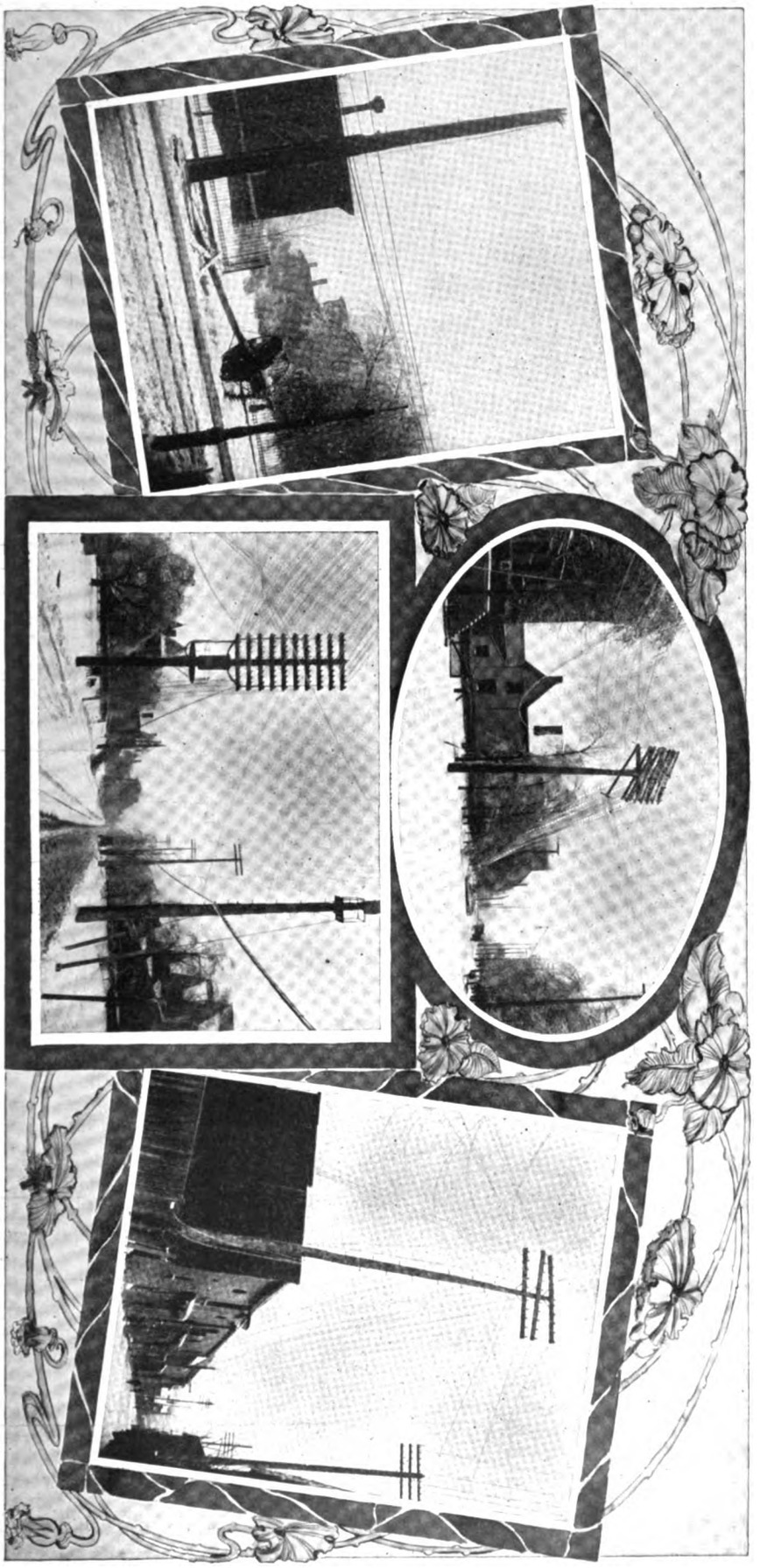

POLES BROKEN AND WIRES DOWN AS FAR AS THE EYE CAN SEE.

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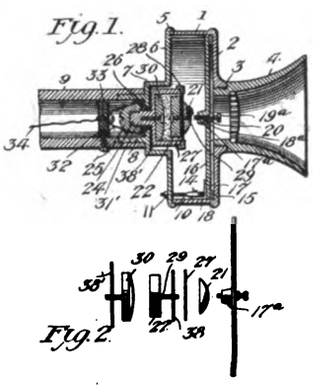
TELEPHONE PATENTS

TELEPHONE TRANSMITTER.

MILTON J. FLETCHER patents (No. 791,892) an improved form of telephone transmitter. The inventor claims to secure greater simplicity in assembling the parts and also ease with which the transmitter can be taken apart for examination and repairs. For this purpose the essential feature of the device consists of a rearwardly projecting cavity 7, which carries the transmitter capsule in a rear cylindrical extension 8. The details of the transmitter capsule are shown in Fig. 2. The striking feature of the device



is that the inventor relies upon the tension of the front diaphragm 16 pressing the point of the screw 19a upon the curved cap 21 of the transmitter chamber to govern the vibration of the front electrode 22.

ELECTRICAL CONDUCTOR.

Charles L. Burlingham and William J. Burton, Chicago, Ill.; patent No. 789,651; dated May 9, 1905; filed February 16, 1903; and assign by mesne assignments to said Burton and Juanita M. Burlingham; an improved form of electrical conductor. This patent generally relates to design of switchboard cords, and consists of the formation of flexible conductors in parallel convolutions. For strength, a wire, preferably of steel, is employed, as the flexible conductor around which is wound a copper wire to increase the electrical conductivity. It is evident from this method of construction, that one or more conducting wires can be wound in parallel without increasing the external diameter of the conductor, and also that the combination of steel and copper wires as described, permits of great strength without losing any of the desired flexibility.

TELEPHONE SYSTEM.

Inventor, John G. Roberts, of Evanston, Ill. No. 790,854. Date, May 23, 1905. Filed Feb. 23, 1901; May 8, 1902. Serial Nos. 48,590, 106,400. The object of this invention is to provide an automatic appliance to relieve the operator of a portion of the work of completing telephonic connections. As the invention is too long and complicated to be abstracted, the reader is recommended to obtain a copy of the original patent.

BINDING POST.

Louis Steinberger, New York, N. Y.; patent No. 789,574; dated May 9, 1905; filed September 26, 1904; an improved form of binding post. The invention essentially consists of a screw which has a thread its entire length. The lower part of the screw is made into the form of a wedge, and has a slot cut at right angles to the wedge in such a manner as to form two prongs. Into this slot can be introduced a wire for furnishing an electrical contact and also to cause the prongs to spread apart, so that when moulded into some such material as rubber it will be impossible to withdraw it. The upper part of the screw is provided with nuts and washers in the usual manner.

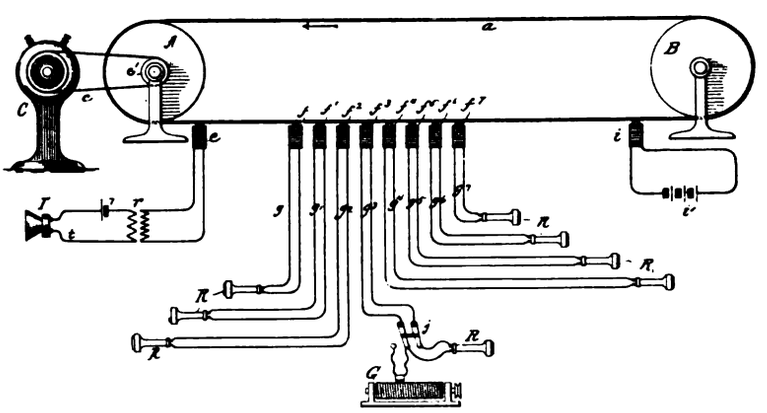
DESK STAND HOLDER.

Edmund Ocumpaugh, Rochester, N. Y., patents No. 790,740, dated May 23, 1905, filed December 26, 1903, and assigns to the Defiance Machine Company, a desk stand holder. In this invention a flanged conical support is employed which has a hole recessed in the top and also a transverse opening in the side near the top. The bracket proper is similar in design to the usual form, the novelty of the devise being in the adaptability of the base to either vertical or horizontal surfaces. If attached to a vertical surface the bracket swings upon a pivot inserted in the top of the support, and if attached to a horizontal surface the pivot is placed in the transverse hole.

TELEGRAPHONE.

Valdemar Poulsen, Copenhagen, Denmark, patents No. 788,728, dated May 2, 1905, filed Aug. 14, 1901, an improved form of telegraphone, whereby the recorded message upon a steel body can be simultaneously distributed to an indefinite number of receiving instruments, so that it is possible for a number of people to receive the same message at a number of different locations. Two pulleys *A B* carry a steel band *a*, which is revolved by means of the motor *C*. The recording magnet *e* is operated through the induction coil *r* from a transmitter *T*; *f f' f²*, etc., are the reproducing magnets placed in circuit with receivers *R*. An obliterating magnet *i* is so situated that as the band passes in front of its pole it uniformly magnetizes it, and thus causes the band to present a uniform condition to the receiving magnet *e*.

In operation, when the operator talks into the transmitter *T*, the magnet *e* magnetizes the band *a* in successive varying degrees, corresponding to the sound waves of the voice of the speaker. The band, being of steel or similar magnetic material, retains these magnetic impressions, and as it moves along carries them successively past the poles of the several magnets. As these poles come under this influence each is subjected to a varying magnetic impulse which generates electric currents in their coils. These currents traverse the circuits to the receivers and cause the latter to respond. Should a party find it inconvenient to listen at a given time, he can switch on a local telegraphone *G* by means of switch *j*, which will record the message, and retain it till such time as he cares to listen to it.



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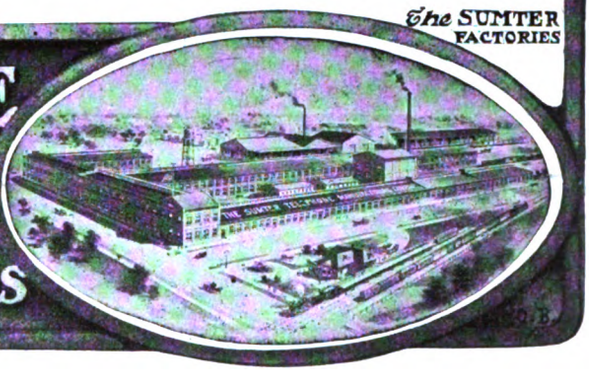

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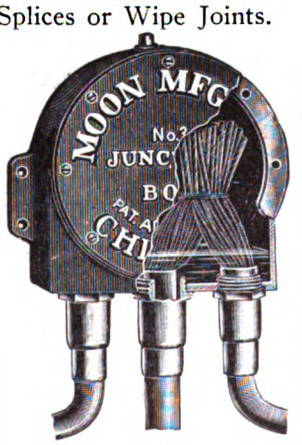

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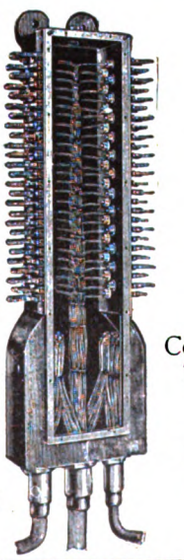

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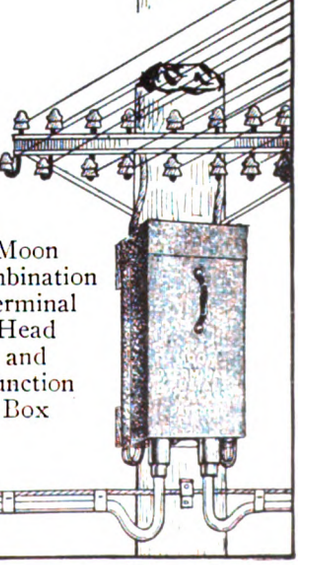

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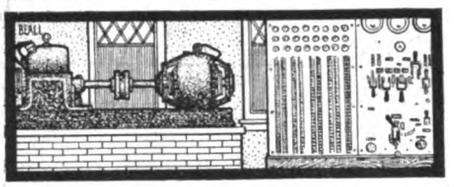
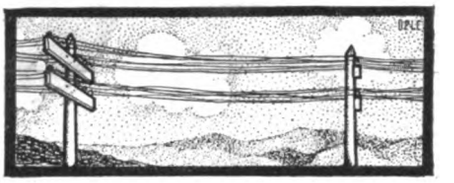


QUERIES

Questions on any subject relating to telephony will be answered on this page.



CONNECTING POLE CHANGER TO SWITCHBOARD.—(574.)

Find enclosed a diagram of a pole changer circuit (Fig. 574A). I want to find out how to make the connections from the switchboard to this machine. Also why is 50 ohms of resistance put in series with the ringing batteries. Also what should I use for this resistance. C. V. M.

Fig. 574B shows the proper connections to make from a switchboard to your pole changer the circuit of which is given in Fig. 574A. A 4-point switch should be provided for changing from the pole changer circuit to the hand generator circuit and vice versa. If there is more than one operator's position at the switchboard, the additional positions should be connected as shown by the dotted lines. The 50 ohms resistance is used to

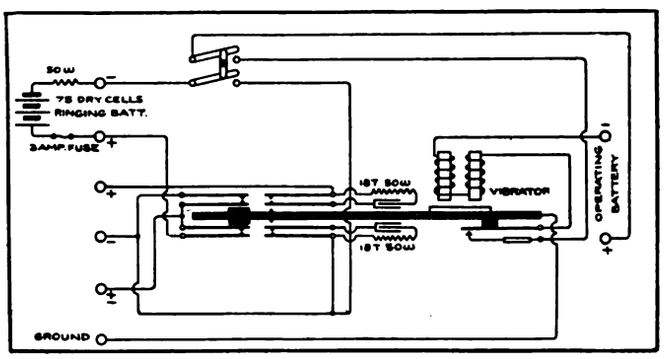


Fig. 574A.

protect the ringing battery or rather regulate its flow and can be any non-inductive winding of sufficient carrying capacity; a coil which will carry 2 amperes without undue heating. When there is more than one operator's position it is customary to place this protecting resistance in the lead to each position, as at *A* and *B*, Fig. 574B, instead of in the battery circuit as at *C*. Now if both operators ring at the same time, each will take current through separate resistances, while if a common resistance was used, the then available current would be divided between the two operators and might not be sufficient to ring the bells.

The binding posts *D* and *E* supply positive (+) and negative (—) pulsating current respectively and are only to be connected to the switchboard when the latter is provided with apparatus and circuits for 4-party selective ringing by the polarity method. When used, an 8-point switch will have to be provided at each operator's position to switch the four leads from the pole changer to the hand generator.

KICK COIL TELEPHONES.—(575.)

Will you please give us a diagram and winding for a kick coil. We figure on using kick coils on a few of our telephones in place of generators. M. P. Y.

A very efficient kick coil which will work well with two dry cells can be made up as follows (see Fig. 575A): The two cores should be made from Norway iron rod three-quarters of an inch in diameter and 3 1-16 inches long, while the two yokes should be made from Norway iron bar with a cross section of three-quarters of an inch by one-half of an inch. The yokes are attached by means of machine screws, three of which are to be of iron and the fourth (*A*) of brass. A thin brass washer (*B*) separates the core from the yoke at the corner where the brass screw *A* is used. This serves to open the magnetic circuit a sufficient amount to allow the coil to discharge quickly and thereby produce the maximum effect on the line circuit. The spool heads should be made from fiber or hard rubber 1⅝ inches square or in diameter. All of the iron posts should be carefully annealed before assembling, so as to allow the magnetic flux to be set up quickly, as the current flow through the coil is at best of very short duration. The secondary winding should be on the spools next to the core and should have about 3,700 turns of No. 29 B. and S. gauge single silk covered wire per spool measuring about 70 ohms, thus giving about 140 for the two spools when connected in series. The primary winding is wound over the secondary and should consist of three layers of No. 19 B. and

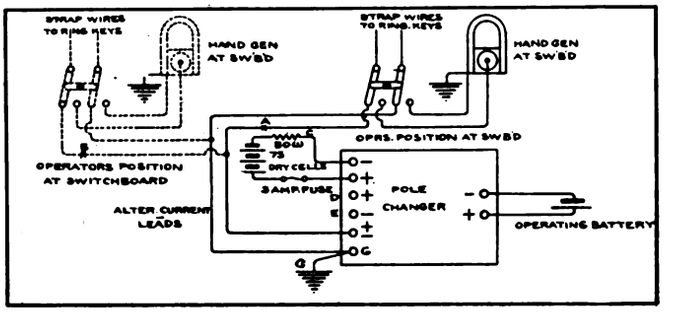


Fig. 574B.

S. gauge single cotton covered wire per spool, giving about 380 turns for both spools and not over 1.2 ohms total resistance. Fig. 575B shows the connection of the winding of the two spools, which are both wound exactly alike. The proper connection to the telephone circuit and the arrangement of the contact springs so as to give a time interval for the charging of the coil are rather difficult problems and require careful study. The original Independent exchanges at St. Louis, Indianapolis and Cleveland used kick coils to operate the drops at central. Retarding devices were used to give a time interval after closing battery on to the coil so as to insure a sufficient charge to operate the drop. At Indianapolis dash pots, similar to those used on arc lamps, were attached to the hook switches to obtain the time interval. It is

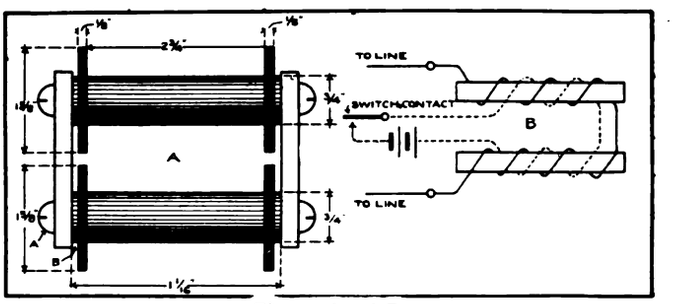


Fig. 575A and B.

hardly necessary to add that all of these schemes gave no end of trouble when compared with the simple telephone equipments of to-day.

UNDERWRITERS ON PROTECTION.—(576.)

We lately had an insurance inspector here who condemned our system as not having a fuse at each telephone. He says it is one of the underwriters' rules that each telephone must have a lightning arrester and fuses at the cables. Do the underwriters' rules require the fuse at the telephone? S. F. Q.

Rule No. 64c. of the "National Electrical Code" (Underwriters' Rules) reads, "All aerial conductors and underground conductors which are directly connected to aerial wires must be provided with some approved protective device, ————" Rule No. 64f specifies the requirements of the protector, which include a lightning arrester and fuses. If the subscribers' line is aerial all the way to the telephone the protector should be at the telephone.

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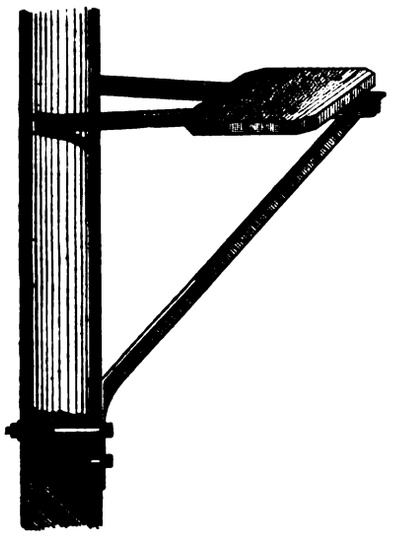

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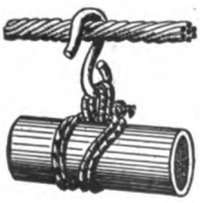

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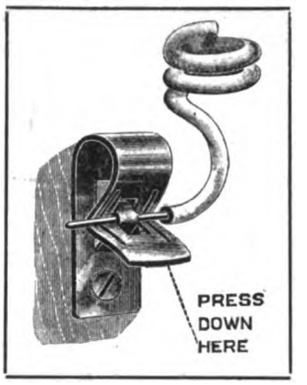

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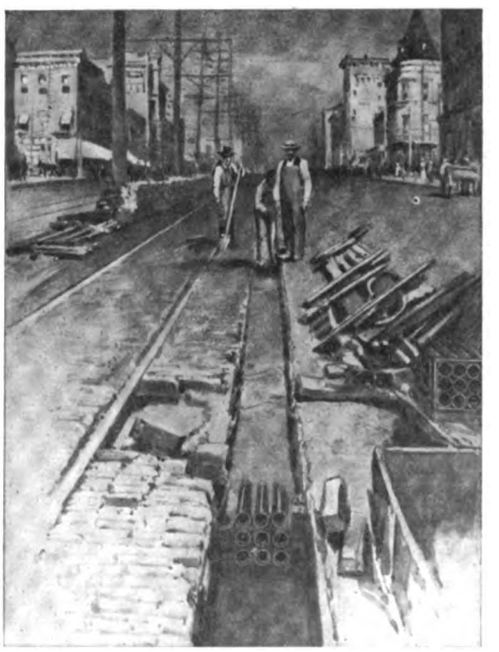

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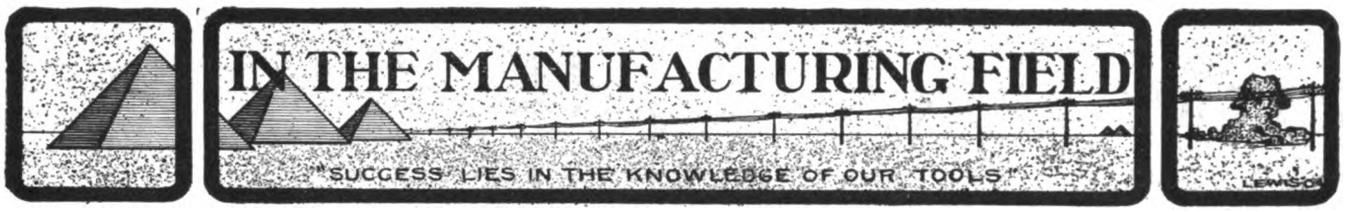
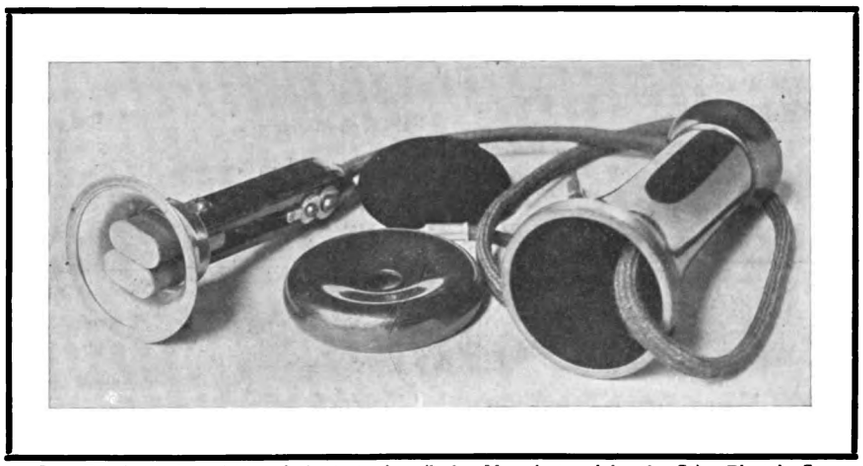


RESULTS OF SECO RECEIVER TESTS.

A SERIES of receiver tests to prove the efficiency of the Seco receiver, manufactured by the Spies Electric Co., 82 West Van Buren street, Chicago, have recently been conducted in a scientific manner by A. E. Dobbs.

The first or preliminary test was made as shown in Fig. 1, in which the current from the battery was passed through a tuning fork interrupter at the rate of about 600 interruptions per second—about note D of the treble clef—while the secondary circuit consisted of the winding of the induction coil—175 ohms, a resistance of 50,000 ohms, and two condensers in series having a capacity of 0.2 M f. In this test the experimenter claims the Seco receiver not only hummed louder than others but it reproduced the note of the tuning fork which the others did not, which tends to prove that this receiver is very sensitive to weak sounds, and that it possesses a small amount of self-induction as shown by its reproducing the tone quality and pitch of the tuning fork interrupter.



Seco Receiver, the subject of the tests described. Manufactured by the Spies Electric Co.

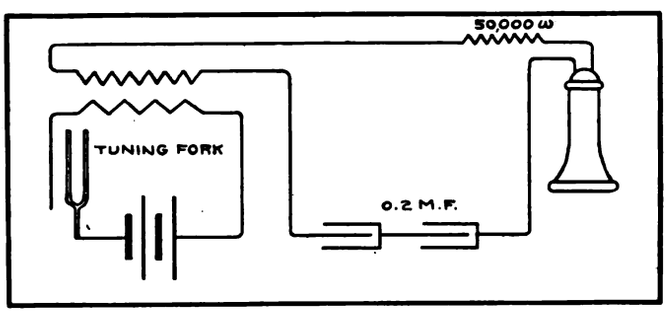


Fig. 1. Circuit Arranged to test for self-inductance of Seco receiver.

Self-induction creates a lagging current in a circuit which favors low notes and tends to eliminate the higher. When a receiver produces a lower pitched note than the one impressed upon the circuit it is an indication that its self-induction is higher than it should be. Effects of self-induction are sometimes made apparent when an iron wire circuit is used, by the voice of a person heard through a telephone, being lower in pitch than what it really is.

It might be argued that as static capacity is usually the leading factor in the average telephone line that a considerable amount of self-induction would be a good thing. This is not the case, however, as static capacity helps out the high notes rather than the low ones. Prof. Pupin has demonstrated that an even distribution of induction capacity is necessary to be effective against the static or leading current. From this it is deduced that the Seco receiver will respond more readily to the electrical conditions of long lines and should therefore be most effective for long distance work.

The next test was to determine the smallest possible amount of current to which the receiver would respond. For this purpose the law of divided circuits was employed. This law states: When an electrical current is offered two paths, it will divide over each path in inverse ratio to their proportional resistances. The test circuit was arranged as shown in Fig. 2. A battery was placed in circuit through a low resistance to regulate the flow current. At a point in the circuit, one tip of the receiver cord was permanently connected to the wire *PC*. The other tip *T* was left free, so that it could be moved to any point desired over the wire *W*. If the point *T* is placed at an appreciable distance from the permanent connection *PC*, it follows that some of the current will leave the wire *W* and pass through the receiver. By employing the formula $\frac{R'}{R''} \times 1$, in which R' is the resistance between the points *T* and *PC*, R'' the resistance of the receiver, and *I* the current flowing in the circuit, the current flowing in each branch can be found. No. 22 copper wire was used for the loop *W*, which has a resistance of about .00016825 ohms for a length of one-eighth of an inch. With one-half an ampere at a pressure of one volt repeated clicks were

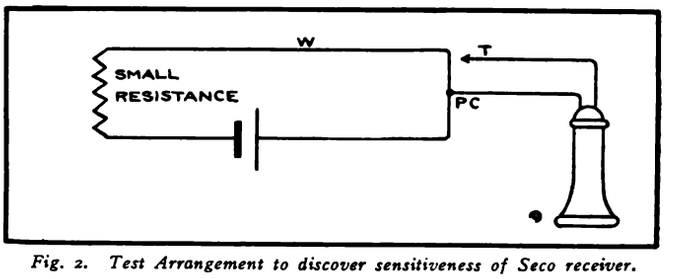


Fig. 2. Test Arrangement to discover sensitiveness of Seco receiver.

heard in the receiver with the tips *T* and *PC* only one-eighth of an inch apart. Applying the formula given above, the current in the receiver circuit was $\frac{.00016825 \times 5}{113} = .0000007$ amperes. In order to know the actual working conditions of the circuit it was necessary to calculate the power in watts. To do this the formula $\frac{R' \times 1 \times E}{R''}$ was employed, *E* representing the voltage. This gave the power at seven ten-millionths of a watt.

The inductance factor of this receiver varied between 105 and 115 Milhenrys. The Spies Electric Company will quote prices upon

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(Patented August 9, 1904)

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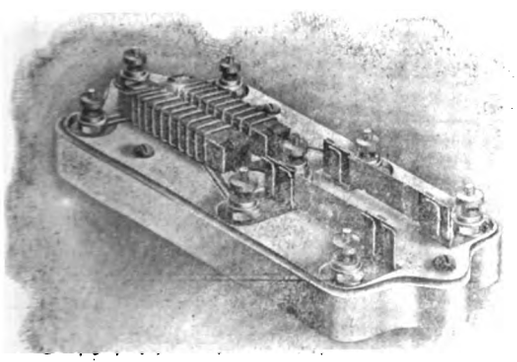

No. 2000
FOR THE PROTECTION OF ELECTRICAL APPARATUS FROM LIGHTNING DISCHARGES
Send for Bulletin 385

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this receiver, and also send full particulars upon request.

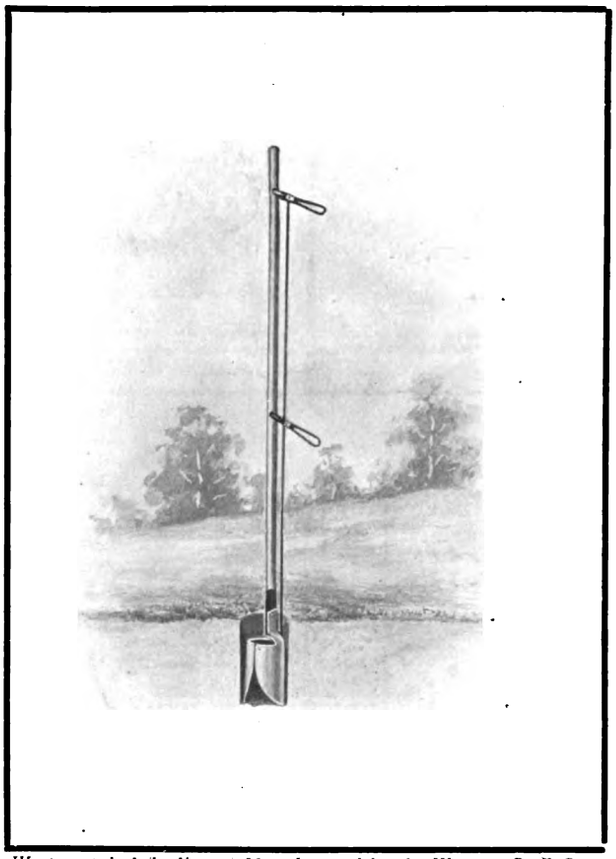
THE STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY, Rochester, N. Y., reports having closed contracts for switchboards for the following places: Ardmore, Ind. Ter.; Minneapolis, Minn.; Cleveland, O.; Marion, O.; Delaware, O.; Furley, Kan.; McLain, Kan.; Idana, Kan.; Corson, S. D.; Brandon, S. D.; Star, Idaho; Ridgeway, Iowa; Lodiburg, Ky.; Bristol, Tenn.; Franklin, Pa.; Granville, N. D.; Bowbells, N. D.; Folsondale, Ky.; East Smithfield, Pa.; Elizabeth, N. C.; Washington, N. C.; Mountain Branch, Tenn.; Berwick, Pa.; Fulton, Kan.; Fenton, Iowa; Pontiac, Ill.; Macon, Ill.; Chicago, Ill.; Fulton, Iowa.

THE ARCHAMBAULT COMPANY, 304 Lenox avenue, New York city, manufacturers of the Archambault kerosene furnace, reports that the furnace is giving satisfaction wherever it is used, and that companies which have tried samples are adopting the furnace exclusively. Among the recent orders received are Central New York Telephone & Telegraph Company, of Syracuse, N. Y., 24; Western Electric Company, Philadelphia, 26; New York Telephone Company, New York, 36; Neil & Brinker Company, supply agents, New York, 36; George Heiland, New York, 24; John Simmons & Co., 26, and many others. In our next issue the Archambault Company will reproduce a letter from the cable foreman of one of the large telephone companies endorsing the furnace in the highest terms. This letter seems to prove conclusively the claims of the manufacturers for this furnace, that it is better, cheaper and safer than any other make. Many similar letters from telephone, telegraph, railway companies and plumbing houses all over the country have recently been received by the Archambault Company. Although this kerosene furnace has only been on the market for less than five months, it has had phenomenal success, and seems destined to eventually supersede the present well-known gasolene type.

A NEW POLE HOLE DIGGER.

A POLE hole digger has been brought out by the Western Steel Gate Company, of Two Rivers, Wis., which has several points of interest to construction men. Special devices to dig holes have been tried before, but the ordinary shovels are the only tools that have been generally used up to the present time.

The digger shown in the accompanying cut, the manufacturers claim, is entirely satisfactory for such work, because it operates in any kind of soil, will dig loose stones of considerable size, and will work at any desired depth. The blades of the digger operate in such a manner that its action is virtually automatic, and for this reason it will operate at the bottom of a deep hole without any special attention on the part of the operator.



Western pole hole digger. Manufactured by the Western Steel Gate Company, Two Rivers, Wis.

When the digger is forced into the earth, its driving weight sends the blades into the soil. It is pulled out by means of the hand levers projecting at the side, the two blades being forced towards each other with sufficient leverage to tear loose, hard clay, stones or roots, and in this position will hold the soil firmly until it is taken from the hole. Releasing the hand lever drops the soil. When holes are being dug in marshy land, where it is necessary to take out mud and water, the blades close until they meet, forming a bucket which clears the hole from water.

The digger is made in two lengths; the regular size for ordinary poles where holes four and five feet deep are required, and the special telephone size, to deepen the holes to seven or eight feet for the larger poles. It will make a hole of any size, and is especially valuable since it avoids the necessity of digging the hole larger than the pole requires.

Special care has been taken in producing this tool, to make it strong enough to dig through very hard soil. At the same time it can be handled more easily than any other tool for this purpose. In ordinary soil the mere action of thrusting it into the hole and withdrawing it extends the hole six to eight inches each time. Although this digger is entirely new on the market, it is for sale by all of the large supply houses. Prices and further information will be given by the manufacturers.

THE EWING MERKLE ELECTRIC COMPANY, 1106 Pine street, St. Louis, Mo., is publishing a magazine entitled the "Everbest," which is devoted to the interests of its business. The current number deals with the growth of St. Louis, and contains a description of the company's plant. A number of crisp, witty stories relative to the electrical industry are included, together with copies of numerous letters received from satisfied customers. As this firm does an extensive business in general electrical supplies, it is its opinion that the value of the apparatus could be more easily shown by this plan than any other. Parties interested in electrical supplies of all descriptions should write for a copy of this magazine.

FRANK B. COOK recently made an application for patent upon a self-soldering heat coil on the 13th of one month, it was allowed on the 13th of another month, and issued on the 13th of June. Three new men have been added to Mr. Cook's sales department, and will push his self-soldering protectors, pole cable terminals and construction material in various parts of the country. Mr. M. A. Gurney is covering Michigan, Indiana and Ohio; Mr. C. C. Newburn will travel in Minnesota and the Dakotas, and Mr. F. A. Rader in Kansas, Nebraska and the Territory. New York and Pennsylvania are being covered for Cook by Mr. James Strasburg, Wisconsin and Illinois by Mr. C. C. Fricke, and Iowa and Missouri by Mr. F. R. Parker.

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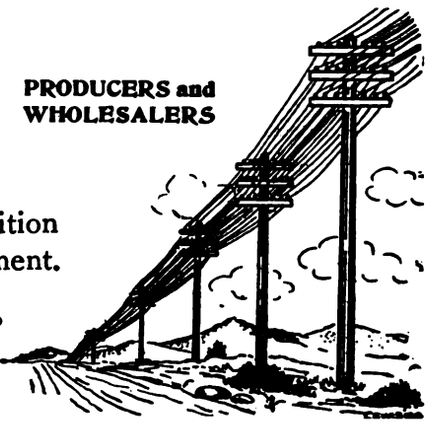

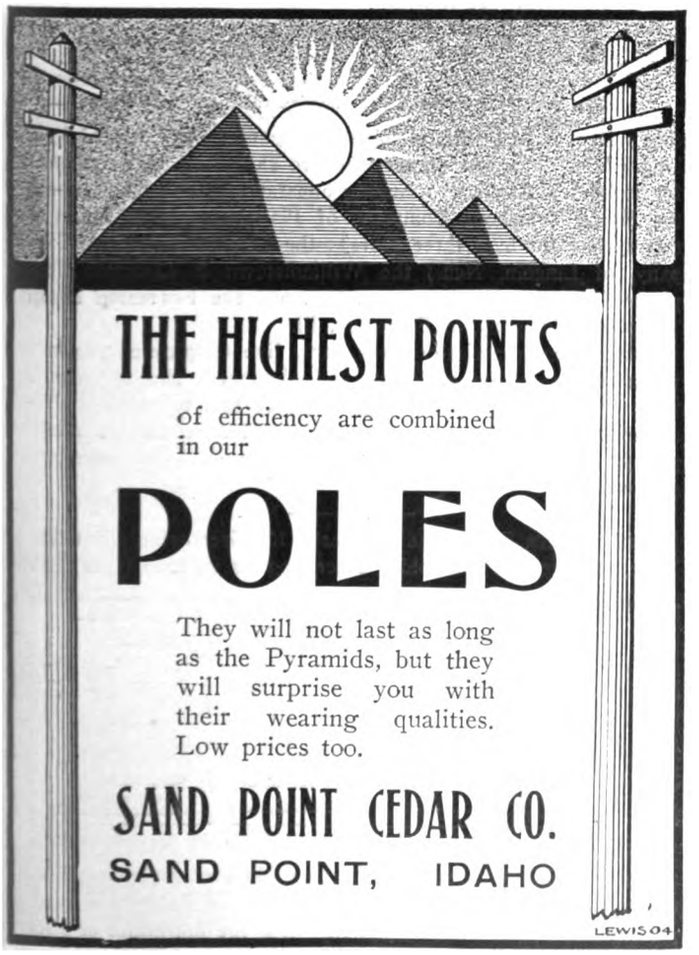

WHITE CEDAR POLES

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If you are in a hurry, try our Minnesota Transfer shipment.

PAGE & HILL CO.

Lumber Exchange, Minneapolis, Minn.

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W. N. MATTHEWS & BRO., St. Louis, Mo., have another advertising card for the Stombaugh guy anchors, which is now being distributed. This card claims for the Stombaugh anchors great holding strength, ease of installation, and that complete satisfaction is given wherever it has been employed. The firm will mail catalogues to all inquirers, and will ship as many anchors as desired for thirty days' trial.

THE AMERICAN ELECTRIC FUSE COMPANY, Chicago, Ill., is issuing a brochure entitled "The Opinion of An Expert," dealing

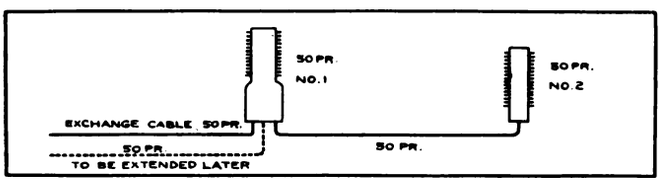

Fig. 1. Showing method of extending multiple cables.

with a series of tests made of Kaisling arresters, by Prof. J. B. Kelsey, formerly of Purdue University. In all, forty coils were subjected to current tests varying in strength from two-tenths to one and a half amperes; to determine the elapsed time between the application of the current and the operation of the fuse. Between one-fourth ampere and one and one-half amperes, the operation of the coils was very constant, each one taking about the same time to fuse. The average time under different current strengths for the coils to act was as follows: Three amperes, 23 seconds; 4 amperes, 8 seconds; 5 amperes, 4.3 seconds; 6 amperes, 3.1 seconds; 7 amperes, 2 seconds; 8 amperes, 1.5 seconds; 1 to 1.5 amperes, 1.25 seconds. The booklet describing these tests will be mailed to parties interested.

MOON SYSTEM OF MULTIPLE CABLE DISTRIBUTION.

IT is the aim in modern telephone construction to build permanently, providing as far as possible for increasing the capacity without abandoning or destroying work previously performed. Multiple cable distribution affords a certain amount

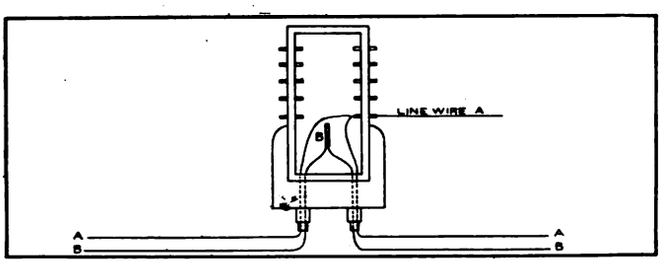

Fig. 2. Illustrates cut in splice for through lines in Moon terminal box.

of expansion by enabling one line to be used at two or more distributing points. As its name implies, the multiple method of cable distribution requires that the pairs appear at two or more terminals. Since it is not always desirable or practical to complete the cable installation at its initial stage of construction, a method that will allow extra cables to be installed, without additional cost for terminals or changing present conditions as herewith described.

From an examination of Fig. 1 it will be seen that the terminals 1 and 2 are first connected in multiple and to the exchange by a fifty pair cable. When desired, a new cable can be run from the exchange to terminal No. 1, and the circuits at that point rearranged. The plan outlined in Fig. 2 is suggested for the new condition. Cable pair *A* is connected to a line terminal in the manner shown. Pair *B* is, however, simply spliced to a pair that does not appear at this terminal, and is continued on.

When temporary multiple distribution is desired, the scheme shown in Fig. 3 is suggested. The exchange cable *A* is at first connected in multiple with the two cables *B* and *C*, the circuits of which being distributed at various points to subscribers' stations, through permanent terminals. When the full capacity of cable *B* or *C* is required, an addition cable, *D*, may be extended from the exchange to the junction box, entering through an opening previously provided, or a 200-pair cable may take the place of cable *A*. If a 200-pair cable is contemplated, a suitable opening in the junction box should be provided. These openings should be standard pipe tap, and then bushings can be used. The splices in the junction boxes are arranged as shown in Fig. 4. The obvious advantage of first extending the cables in multiple, and later increasing the capacity by using junction boxes is apparent, as none of the original cable work need be disturbed. The cable *B*, shown vertical in Fig. 4, can, of course, be extended in any direction; it is so drawn in the illustration to clearly indicate its purpose. Apparatus which permits of the foregoing method of distribution is manufactured by the Moon Manufacturing Company, 43-49 South Canal street, Chicago, Ill., to whom inquiries should be sent.

THE BAIRD MANUFACTURING CO., of 6 Michigan street, Chicago, Ill., reports that additional orders are being constantly received for its secret service telephone system, which proves that

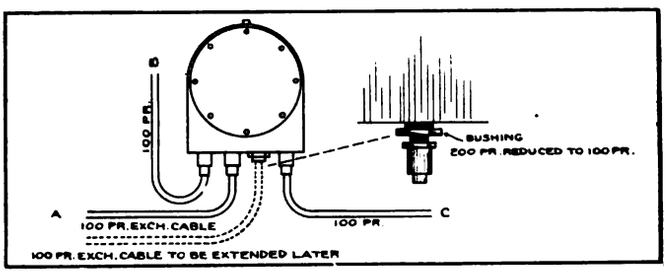

Fig. 3. Moon terminal box showing cable entrance way.

this system is just what telephone companies have needed for a long while. Amongst others who are extending this equipment for lockout and selective ringing apparatus might be mentioned the Home Telephone Company, of Plattsburg, Ohio (users of this system for over three years); the Lincoln Telephone Company, of Lincoln, Neb.; the Williamstown & Owenton Telephone Company, Williamstown, Ky., and the Forreston Mutual Telephone Company, of Forreston, Ill.

This system practically gives party line telephones two individual wires to the exchange and eliminates the nuisance of "listening in," so objectionable on party line telephones. The manufacturers claim it to be a wonderful development in telephony, and that it bids fair to revolutionize rural telephone service.

THE SPENCER ELECTRICAL COMPANY, 163 Greenwich street, New York, is distributing a folder describing its various types of in-

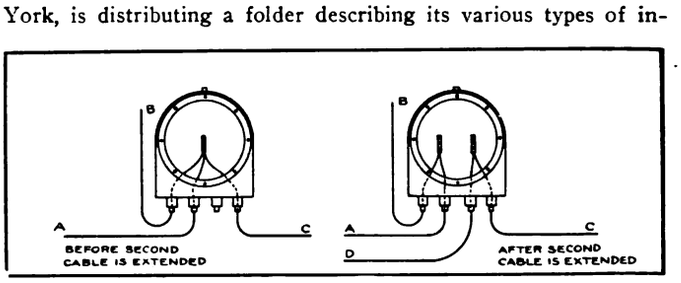

Fig. 4. Illustrates method of cable extensions with Moon terminal.

tercommunicating apparatus. Sixteen different styles are listed to meet various requirements. The company claims for its apparatus the maximum of simplicity with the minimum of parts. A central battery is employed for both ringing and talking.

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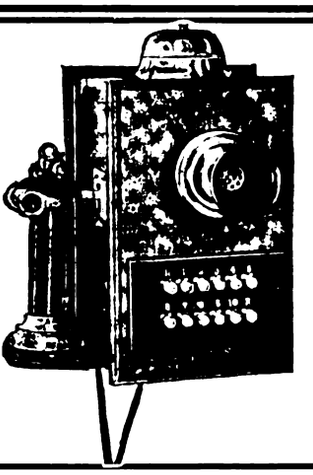
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THE WEEK'S MESSAGES

FINANCIAL.

INDIANAPOLIS, IND.—At the recent meeting of the Board of Directors of the New Telephone Long Distance Company, the regular quarterly dividend of 1 per cent was declared. The books of the company will close June 25.

LAINGSBURG, MICH.—The Laingsburg Telephone Company has increased its capital from $25,00 to $100,000.

JOPLIN, MO.—The Home Telephone Company has increased its stock from $200,000 to $750,000.

COBLESKILL, N. Y.—The Cobleskill is to increase its capital from $6,000 to $15,000.

ELKSVILLE, N. Y.—The Jackson County Telephone Company, Elksville, has increased its capital stock from $2,450 to $21,000.

CLEVELAND, O.—On July 6 the Cuyahoga Telephone Company paid a dividend of 9 per cent on its preferred stock. This dividend is the accumulation on the preferred stock to July 1. In the future the officials say the company will pay its dividends on preferred stock promptly as due. Another dividend will not be due until January 1, when the semi-annual dividend of 3 per cent will be paid.

CLEVELAND, OKLA.—The Farmers' Central Telephone Company, of Cleveland, Okla., has increased its capital stock to $3,500.

PERRYSVILLE, O.—The Farmers' Telephone Company, of Perrysville, has increased its stock from $5,000 to $6,000.

WAYNESFIELD, O.—The Auglaize Telephone Company, Waynesfield, has increased its capital stock from $15,000 to $25,000.

PHILADELPHIA, PA.—It is reported that the Keystone Telephone Company is now earning on a basis of $800,000 gross and $420,000 net per annum, as against $685,740 gross and $325,438 net in 1904. The net earnings for the first quarter of 1905 were $100,432, and the estimate for the second quarter ending June 30 being at fully $110,000, over $210,000 will be shown for the six months.

FRANCHISES.

WALKER, IA.—The Walker Telephone and Telegraph Company has been granted a franchise at Walker.

BURDEN, KAN.—The Mutual Telephone Engineering and Supply Company, of Wellington, Kan., has been granted a franchise to build a telephone system in Burden.

MULBERRY, KAN.—The Mulberry Telephone Company has been granted a franchise to build an exchange at Mulberry, and rural lines will be built also.

LITCHFIELD, MINN.—A franchise has been granted the Tri-State Telephone Company to put a local system in Litchfield. The company will spend about $10,000 in improvements.

ROCHESTER, MINN.—The Tri-State Telephone and Telegraph Company has been granted a right of way into the city of Rochester.

HUDSON, WIS.—The Hudson Prairie Telephone Company has applied for a franchise at Hudson, Wis.

ELECTIONS.

WASHINGTON PRAIRIE, IA.—At the annual meeting of the Glenwood Farmers' Telephone Company, held at Nasset recently, the following officers were elected for the ensuing year: President, G. Johnson; vice-president, J. Kallevang; secretary, C. O. Fortun; treasurer, N. A. Eyenrud; directors, O. Ruen, A. O. Blegen, P. Klinkenberg, C. Oddan, J. Ehri; electricians, O. I. Berge and A. Thune.

WATERLOO, IA.—The Corn Belt Telephone Company, Waterloo, Ia., has elected the following officers: President, A. T. Averill; vice-president, C. W. Chapman; secretary, S. S. Lichty; treasurer, W. J. French.

PAXICO, KAN.—The Paxico Telephone Company has elected the following officers for the ensuing year: William Strowig, president; John Hund, vice-president; William Breymeyer, treasurer; O. E. Webb, secretary.

SEDALIA, MO.—The recent meeting of the Missouri Independent Telephone Association was largely attended, the purpose of the meeting being mainly the revising of the constituiton and by-laws of the association. President Gary, of Macon, presided, and Frank S. Leach, of Sedalia, was secretary of the meeting. A change was made in the constitution to enable the Missouri Association to become a member of the National Interstate Association whenever it may be deemed advisable. The following officers were elected: President, Frank Buffman; vice-president, W. B. Scruggs; Executive Committee, Theodore Gary, J. A. Hudson, F. C. Taggart.

HAMMONTON, N. J.—The Hammonton Telephone Company has elected the following officers: President, A. J. Rider; vice-president, M. L. Jackson; secretary, L. Frank L. Horne.

BUFFALO, N. Y.—The Consolidated Telephone Company, which recently purchased the stock of the Frontier Telephone Company, at a meeting of its directors recently voted to increase its directorate, and these men were elected: John Markle, Wilkesbarre; J. Sloat Fassett, Elmira; E. Frank Brewster, Rochester; George W. Thayer, Rochester; V. Moreat Smith, Rochester; Charles W. Goodyear, Buffalo.

WATERVILLE, O.—The Citizens' Telephone Company, of this place, which was recently incorporated by Southard & Southard, of Toledo, has elected the following officers: President, C. E. Shaffmaster; vice-president, H. F. Van Fleet; secretary and manager, D. J. Farnsworth; treasurer, C. R. Shoemaker. The officers, with Dr. J. R. McOscar, will constitute the Board of Directors.

COMBINATIONS.

ONAWA, IA.—The Monona County Telephone Company has been absorbed by the new State Telephone Company of Sioux City, which also takes the local exchanges at Onawa and other towns.

GASTONIA, N. C.—The Piedmont Telephone and Telegraph Company has absorbed the telephone interests of the Bedford Telephone Company, which operated systems at Yorkville, Hickory Grove, etc.

BOLIVAR, N. Y.—The Bolivar Telephone Company has bought the telephone system of the Oswayo Valley Telephone Company, with headquarters at Shingle House, Pa.

MASON, TEX.—Gus W. Schuessler sold out his entire telephone interests a few days ago to the Texas Telephone and Telegraph Company for $7,000. This includes the line to Brady, Menardville and London, also the local system. The company will retain Mr. Schuessler as manager at a liberal salary.

APPLETON, WIS.—The first step of the Independent telephone lines of Wisconsin to compete with the Bell Telephone Company took place recently, when the Independent lines of Fox River Valley and of Eastern Wisconsin were consolidated.

NEW COMPANIES.

MENA, ARK.—The Mena and Arkansas Railroad Company is to be build a telephone line from Mena to Black Springs.

SANTA ROSA, CAL.—The Upper Dry Creek Valley Telephone Company has been incorporated with a capital stock of $12,000.

DECORAH, IA.—The North Calmar Telephone Company, Decorah, has been incorporated with a capital stock of $3,040. Incorporators: Nels J. Hegg and others.

AMES, IA.—The West Milford Farmers' Telephone Company has been organized with a capital stock of $3,000. President, F. D. Smith; vice-president, Lee Smith; secretary, C. P. Ruth; treasurer, E. Livingston.

LIME CITY, IA.—The Lime City Telephone Company has been organized at Lime City. President, J. Barclay; vice-president, E. Proctor; secretary, George Zesinger; treasurer, Will Straub.

WAUKON, IA.—The Eutyen and New Albin Telephone Company has been incorporated. Present capitalization is about $2,800.

CUBA, KAN.—The Cuba Telephone Company has been organized and will build an exchange in Cuba.

GUEDA SPRINGS, KAN.—The Gueda Springs Telephone Company has been organized. It will build an exchange in Gueda Springs, and rural lines to connect with the exchange; also lines to Oxford and South Haven.

STOCKTON, KAN.—The Stockton and Ash Creek Telephone Company has been incorporated with a capital stock of $2,000.

PADUCAH, KY.—The Paducah Home Telephone Company has been incorporated with a capital stock of $230,000.

SMYRNA MILLS, ME.—The Independent Telephone Company has been incorporated at Smyrna Mills with a capital stock of $10,000. Incorporators: J. H. White, Ashland; A. P. Daggett, S. O. Stevens and others of Smyrna Mills.

DEERWOOD, MINN.—The Deerwood and Bay Lake Telephone Company has been incorporated. Incorporators: A. N. Gray, David Archibald and A. A. Miller, of Bay Lake, and H. J. Hagne and O. C. Coffin, of Deerwood. The company will build a line from Deerwood to Bay Lake.

BISMARCK, MO.—The Bismarck Telephone Company, of Bismarck, has been incorporated with a capital stock of $3,000. Incorporators: J. L. Eaton, O. W. Ramsey and others.

FRANKLIN, MO.—Farmers' Central Telephone Company, of Franklin,

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WRITE ME FOR ANYTHING YOU WANT IN THIS LINE

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has been incorporated with a capital stock of $3,500. Incorporators: E. W. Swallow, Simon Bruesch.

LAMAR, MO.—The Lamar and Barton County Telephone Company, of Lamar, has been incorporated with a capital stock of $40,000. Incorporators: J. W. Layne, J. B. McGilvray, E. J. Layne and others.

JERSEY CITY, N. J.—The Coast Line Telephone Company has been incorporated with a capital stock of $100,000. Incorporators: D. A. Reynolds, Eugene H. Brock, 32 Broadway, New York, and E. P. Clark, Jersey City.

CANNONSVILLE, N. Y.—The Rock Rift, Cannonsville and Granton Telephone Company has been incorporated with a capital of $260. Incorporators: D. C. Gregory, L. H. Owens, R. K. Palmerters, of Cannonsville, and others.

FULTON, N. Y.—The Patrons' Telephone Company, Fulton, Oswego county, has been incorporated with a capital stock of $25,000. Directors: G. D. Adams, L. D. Beardsley, O. B. Kellogg, Fulton, N. Y.

OLIVE BRIDGE, N. Y.—The Olive Telephone Company, Olive Bridge, N. Y., has been incorporated with a capital stock of $500. Incorporators: Frank Roasa and J. V. Merrchew, of Olive Bridge, N. Y., and J. S. Hill, of Shokan, N. Y.

UNION SPRINGS, N. Y.—The Woodworth Telephone and Telegraph Company, Union Springs, N. Y., has been incorporated with a capital stock of $15,000. Incorporators: J. P. and Henrietta Woodworth, Oscar J. Spencer and A. M. Seekell, all of Union Springs.

MORRISTOWN, O.—The Morristown Telephone Company has been incorporated at Columbus, with a capital stock of $3,000. Incorporators: R. M. Eaton, W. T. McCreary, John Jeffrey, A. K. Orrison and William Shepherd.

GUTHRIE, OKLA.—The Rural Telephone Company, of Oklahoma county, has been incorporated with a capital stock of $10,000. Incorporators: W. P. Moore, C. H. Randall, William Carson and others.

OKLAHOMA CITY, OKLA.—The Lone Wolf Telephone Company, Oklahoma City, has been incorporated with a capital stock of $2,500. Incorporators: R. A. Woolridge and John H. Wright, of Oklahoma City, and D. L. Stromquiest, of Mulhall.

OKLAHOMA CITY, OKLA.—The Fort Cobb Telephone Company, of Oklahoma City, has been incorporated with a capital stock of $2,500. Incorporators are R. A. Woolridge and John H. Wright, of Oklahoma City, and E. J. Luce, of Fort Cobb.

EUGENE, ORE.—The McKenzie Valley Telephone Company has been organized with the following officers: President, William Platt; vice-president, Noah Rhodes; secretary, C. R. Hastings.

PORTLAND, ORE.—The Home Telephone and Telegraph Company has been incorporated with a capital stock of $3,000,000. Incorporators are C. E. Sumner, A. K. Wilson and A. Andrews.

WATERVILLE, O.—The Citizens' Telephone Company, Waterville, has been incorporated with a stock of $50,000. President, C. E. Shoemaker.

MONONGAHELA CITY, PA.—The Monongahela Telephone Company, Monongahela City, has been incorporated with a capital of $30,000.

SALADASBURG, PA.—The Saladasburg and Linden Telephone Company, Saladasburg, has been incorporated with a capital stock of $5,000.

SNYDER, TEX.—The Snyder Telephone Company, of Snyder, has been incorporated with a capital stock of $5,000. Incorporators: S. J. Holena, J. G. Cormack, Oles Stofer, Fred T. Switzer and J. V. McClintic.

LEW, VA.—The North Frederick Telephone Company, of Lew, Frederick county, Va., has been incorporated with a capital stock of $1,000. S. E. Brown, president; L. Jackson, vice-president, secretary and treasurer.

MADISON, WIS.—Three Madison men have formed a new telegraph and telephone company. The company is called the Chicago and St. Paul Telegraph Company. Milwaukee is included in the line plans. The capital stock is $100,000, divided into 1,000 shares of $100 each. The incorporators are A. G. Zimmerman County Judge of Dane county, and Attorneys Rufus B. Smith and Alfred T. Rogers.

MISCELLANEOUS.

WARROAD, MINN.—The Warroad Telephone Company has sustained a $3,000 loss by fire.

ST. LOUIS, MO.—The City Council has made arrangements with the Kinloch Telephone Company to place telephones in various parts of the city for the exclusive use of the police and fire department.

RED BANK, N. J.—The Red Bank Telephone Company and the Freehold Telephone Company, which were recently sold, are to be reorganized and improved at once.

BRANCHVILLE, N. Y.—The Sussex Telephone Company has installed a new switchboard in its local office.

HARRISBURG, PA.—The State of Pennsylvania has renewed the contract for telephones in the State Capitol held by the United Telephone and Telegraph Company for the ensuing year. This Independent company has ben serving the State practically since establishing itself in the Capital City.

NASHVILLE, TENN.—Ernest T. Mitchell and C. A. Thatcher, of Chicago, representing the Automatic interests, are said to have appeared before the City council of Nashville recently, and to have applied for a fifty-year franchise, offering the city the privilege of buying the plant at the expiration of twenty-five years.

BELMONT, W. VA.—The Belmont Telephone Company has completed a line to Maynard. The line is connected with St. Clairsville.

DEPERE, WIS.—The Manitowoc and Western Telephone Company is planning an extension from Greenleaf to Green Bay. The company operates a farmers' system.

PERSONAL.

ROSCOE HOWARD has been appointed manager for the Home Telephone Company of San Diego, Cal.

WILLIAM MOONEY has been appointed manager of the telephone exchange at Orland, Cook county, Ill.

LOUIS HOLWEGG has been elected president of the New Telephone Companies in Indianapolis to succeed S. P. Shurin, deceased.

J. W. THOMAS has been appointed manager of the Cumberland Telephone and Telegraph Company at Vinton, La.

C. P. WAINMAN, of St. Cloud, will succeed Mr. Pettengill as vice-president of the Duluth, Minn., Telephone Company and of the Mesaba Telephone Company.

J. P. WALSH has been appointed manager for the North Western Telephone Company at Fargo, N. D.

CHARLES A. CARL, manager of the United Telephone and Telegraph Company's office at Carlisle, Pa., has been transferred to the office at Chambersburg. H. F. Snyder, heretofore attached to the Harrisburg office, has been sent to Carlisle.

F. E. REBEN, of Marinette, Wis., has been engaged by the City Council of Brookings, S. D., as manager of the municipal telephone system.

New Construction in the Field

WALLACETOWN, ONT., CAN.—The Wallacetown Telephone Company is to extend its line to Fingal.

WASHINGTON, ILL.—The Washington Telephone Company will put in 3,100 feet of new cable.

WATSEKA, ILL.—The Watseka Home Telephone Company is to build a line to Kankakee.

STAR CITY, IND.—The Star City Telephone Company is making many extensions to its lines.

WOODWARD, IA.—The People's Mutual Telephone Company will consolidate with the Wells and Granger lines.

CLYDE, KAN.—The Clyde Telephone Company, of Clyde, is to rebuild and increase its system.

RIVERHEAD, N. Y.—The Baiting Hollow and Roanoke Telephone Company has completed its line across Long Island to East Quogue, an important step in the advancement of the local concern. A large number of telephones are shortly to be connected on the south side of the island.

NORTH AMHERST, MASS.—Th Amherst Telephone Company is putting up a new line from North Amherst to Amherst.

WENDELL, MASS.—The Highland Telephone Company is to construct a line from the center to the west part of the town.

BAINBRIDGE, MICH.—The Bainbridge Telephone Company is to extend its lines to Watervliet.

COMFREY, MINN.—The Comfrey Rural Telephone Company is to at once take steps to build the lines which they have under consideration.

GRANITE FALLS, MINN.—The Granite Falls Telephone Company is to construct a complete line from Granite Falls, Minn., to the surrounding country. It will advertise at once for bids for constructing the line.

MANKATO, MINN.—The Mankato Telephone Company has ordered a switchboard for Mankato, and five new lines will be built at once.

ODIN, MINN.—The Odin Farmers' Telephone Company is to extend its line to Butterfield.

LOUTTO, NEB.—The Petersburg and Albion Independent Telephone companies are building lines to this place which will give them direct connection.

WESTFORD, N. Y.—The Davis Telephone Company is to extend its lines from Westford to Schenevus.

LAWTON, OKLA.—The Topeka and El Reno Telephone Company is to rebuild its line which was destroyed recently.

JOHNSTOWN, PA.—The Somerset County Telephone Company is to extend its system into all parts of the country. About $20,000 will be expended in this work.

FORT WORTH, TEX.—Superintendent of Construction J. R. Bates, of the Fort Worth Long Distance Telephone Company, has commenced the construction of the line from this point to Waxahachie. Arrangements have also been perfected for the construction of a line to Cleburne, Weatherford, Granbury, Stephenville and Dublin.

GRATIOT, WIS.—The Badger Farm Telephone Company is to build a line to Darlington.

MANITOWOC, WIS.—The Manitowoc and Western Telephone Company is to extend its line from Greenleaf to Green Bay.

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THIS IS NO LIE

Our Advertisements Cite Facts

No. 13 Pay Station
This Type Made With
From 1 to 5 Slots

9/10 of the Telephone Companies in U. S. and Canada who buy Pay-Stations

USE BAIRD'S

WHY DON'T YOU?

Pay-Stations for every kind of Toll Service at the right price

Write for Descriptive Catalogue and Price List.

Baird Manufacturing Company

Makers of Baird Secret-Service Telephone System

6 MICHIGAN ST., CHICAGO

Ready Pole Seats

Strongest Pole Seat Made.

All Iron, adjustable to any Pole.

Ready Reels, Tools, &c. Cable and Telephone Supplies

The W. G. Nagel Electric Co.

Toledo, Ohio.

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Baker & Co..... 1
Baird Mfg. Co..... 9
Beidler, Francis, & Co..... 39
Benedict & Burnham Brass and Copper Co..... —
Bissell Co., The F.....34 and 39
Blakeslee Forging Co..... 38
Boggs, J. S..... 39
Bruno Grosche & Co..... 1
Buffalo Steel Co..... —
Bull Tongue Land Anchor..... 40
Butterfield, J. F..... 38
Cadiz Electric Co..... 35
Campbell, Donald A., & Co..... 41
Carbolineum Wood Preserving Co. 39
Central Telephone & Elec. Co..... 14
Century Telephone Const. Co..... 5
Chicago Solder Co..... 9
Connecticut Teleph. & Electric Co. 8
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Couch Co., S. H..... 8
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Dean Electric Co..... 7
Doubleday-Hill Electric Co..... 2
Eastern Telephone Mfg. Co..... 40
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Hemingway Glass Co..... —
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Lanz, M., & Sons..... 38
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Merritt & Co..... 38
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Monarch Electric & Wire Co..... 35
Monarch Telephone Mfg. Co..... 6
Moon Manufacturing Co..... —
Morgan & Wright..... —
Mountain State Electric Co..... 3
Mueller, William, Co..... 36
Nagel, W. G., Electric Co..... 9
National Telephone Supply Co.... 14
National Wire Corporation..... 42
Norfolk Creosoting Co..... 40
North Electric Co..... 4
Okonite Co..... —
Oliver Manufacturing Co..... —
Page & Hill Co..... 36
Pendleton & Gilkey..... 39
Pignolet, L. M..... 1
Pittsburg & L., Superior Iron Co.. 36
Plume & Atwood Mfg. Co..... 1
Porter Cedar Co..... 39
Rock Island Battery Co..... —
Roebling, John A., Sons Co..... 42
Roth Bros. & Co..... 35
Runzel Lenz Elec. Mfg. Co..... —
Sand Point Cedar Co..... 36
Schaper Construction Material Co. 40
Simplex Electric Co..... 1
Standard Underground Cable Co.. —
Stanton, L. W.....1 and 32
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Swedish American Telephone Co.. —
T. & A. Selective Call Co..... 38
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United Telephone & Switchboard Co..... 33
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Wanted, Situations, etc..... 31
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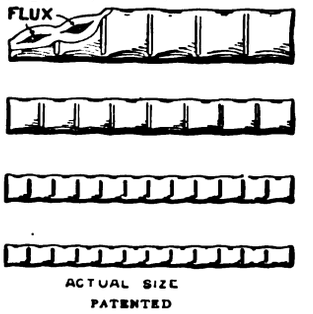
If you want solder that will flow quickly and surely to place and leave smooth work without losing time in preparing or applying flux acid, get

Kester Self-Fluxing SOLDER

Clean to handle, quick, sure, economical and convenient.



ACTUAL SIZE
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Made in four sizes and with various fluxes,—"Kester" rosin, stearic acid, etc.

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ST. LOUIS, MO., Gen. Western Agent

CHICAGO SOLDER CO.

Formerly Kester Electric Mfg. Co.

52 No. Union Street, CHICAGO, ILL.

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The Time-Stamp Tells The Tale ~

"Promptness" Is Our Motto

JULY 1, 1905

AM PM

MAIL DEPT.

RECEIVING AN ORDER BY MAIL

JULY 1, 1905

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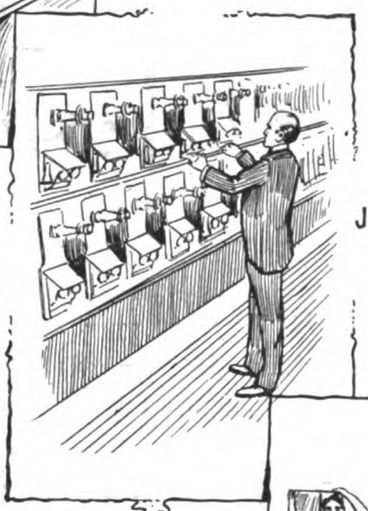
ORDER DEP'T.

WRITING OUT THE SHOP ORDER



JULY 1 1905

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STOCK ROOM

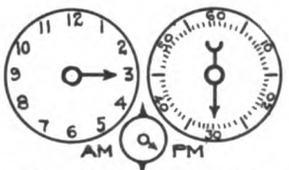
SELECTING TELEPHONES FROM STOCK

Kellogg Switchboard & Supply Company Chicago, Ill.

BRANCHES

NEW YORK ~ 116-NASSAU ST.,
PHILADELPHIA ~ KEYSTONE BLDG.,
CLEVELAND ~ ELECTRIC BLDG.
LOS ANGELES ~ SEYMOUR BLDG.

JULY 1, 1905



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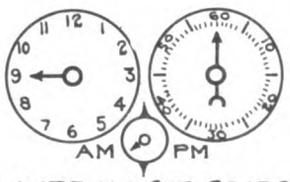
PACKING ROOM

PACKING TELEPHONES FOR SHIPMENT

IMPORTANT

WE WISH TO STRONGLY EMPHASIZE THE FACT THAT WE ARE SHIPPING REGULAR MAGNETO TELEPHONES FROM STOCK ~

JULY 3, 1905



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DELIVERING THE GOODS

TIME OF DELIVERY GOVERNED BY DISTANCE TO BE SHIPPED

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COOK'S JUNCTION BOX

and

Cook's Combined Box and Terminal

It renders sleeve splicing or wiped joints unnecessary.

It is absolutely moisture proof and has a sliding galvanized sheet metal cover which furnishes added protection.

Equipped with self-soldering nozzles

Cook's Junction Box can be furnished either separate or combined with a terminal. **If desired, the junction box may be installed and the terminal added at any future time.**

This is a new and original feature of the Cook box.

Write for lowest prices.

Frank B. Cook

Manufacturer

238 West Lake St., CHICAGO, ILL.

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STROMBERG-CARLSON

THE Kinloch Telephone Co., St. Louis, Mo., has recently awarded us a contract for a switchboard which will be the largest ever undertaken by any manufacturer and when completed will be the largest switchboard in the world.

THE PRESENT EQUIPMENT WILL CONSIST OF

37-A-sections, each equipped with a multiple of 12,500 subscriber lines and 420 outgoing trunk lines, there being answering jack equipments for 14,680 lines divided among the 111-A-operators.

The switchboards approaching nearest to the St. Louis equipment, in size, are the Buda Pest and St. Petersburg boards, each of which were equipped with 10,000 lines.

This recognition of *quality apparatus* is especially pleasing to us because the purchaser is one of the oldest Independent Companies and the first one to install a *large* multiple switchboard.

We shall spare no pains to make this equipment the finest exchange in the world.

Parties contemplating putting in a new exchange or making additions would do well to profit by the experience of this Company.

TELEPHONE M'F'G. CO.

ROCHESTER, N.Y. CHICAGO, ILL.

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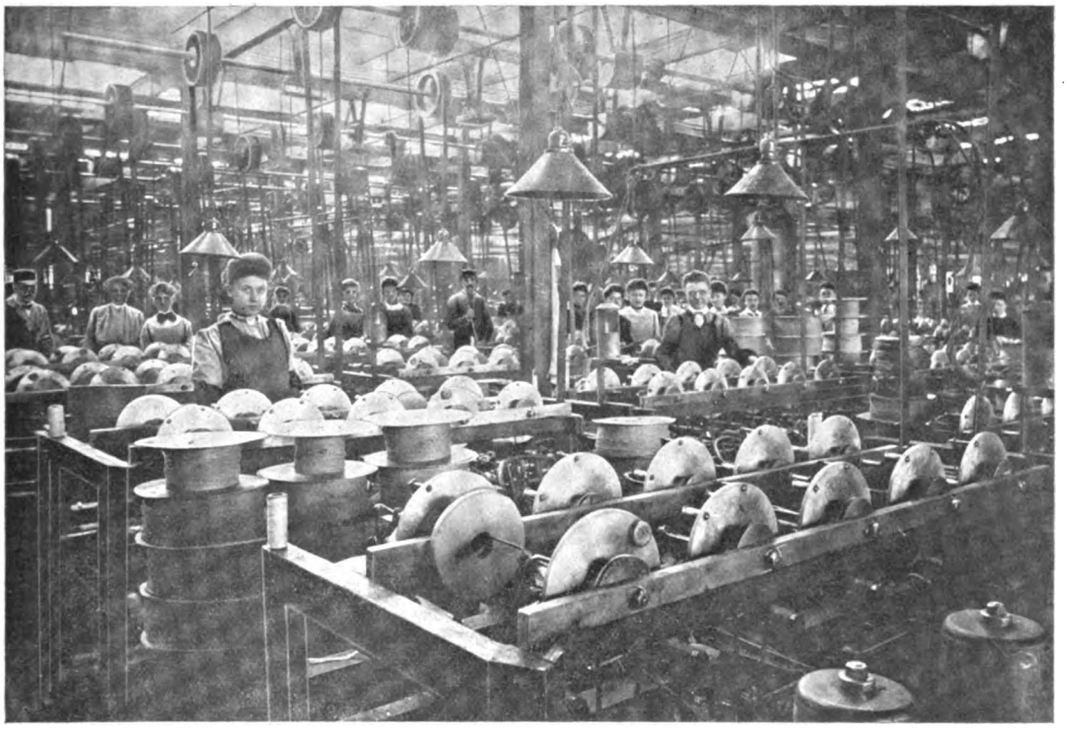
WE MAKE CABLE

"INSULATING"

THE WIRE that TALKS with THE PAPER that PAYS

The first operation in the manufacture of paper insulated telephone Cable is insulating the single conductors and twisting them in pairs. This is performed after the bare copper wire and insulating paper have passed their chemical and electrical tests.

One wire of each pair has grey and the other red insulation. The manner in which the wire is served with the insulating paper is one of the



things that regulate the electrostatic capacity as shown by the final test of the finished cable. Therefore this operation is performed with extreme care by skilled operators.

The above illustration shows a portion of our insulating department equipped with the most modern horizontal type of insulating machines. The entire product of these machines is minutely inspected for any defects in manufacture or material.

This inspection is facilitated by exceptional lighting of numerous skylights, making it impossible for any defects to escape the attention of the operator.

Remember we are always glad to quote prices

STROMBERG-CARLSON TELEPHONE MFG'CO.

ROCHESTER., N.Y. CHICAGO., ILL.

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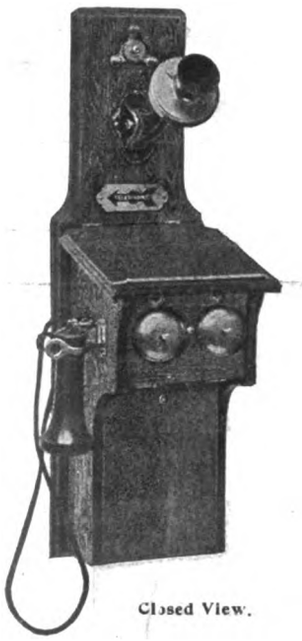
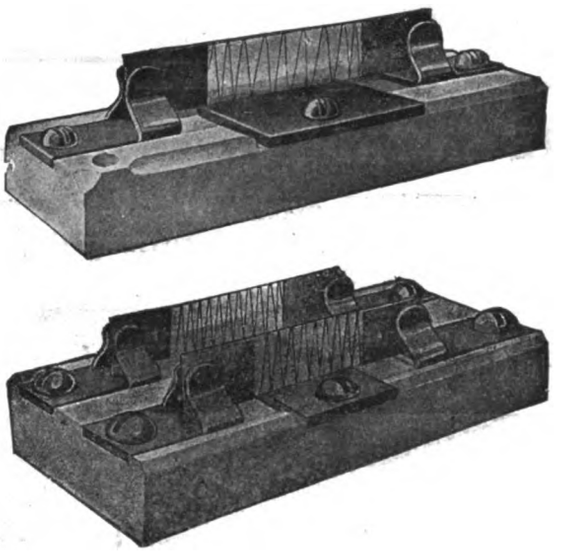
GET IN LINE ON UP TO DATE APPARATUS

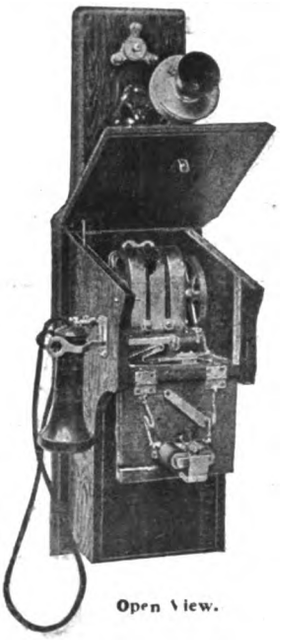
If you order Central "Leader Junior" Telephones you will be buying now what you are sure to buy ten years from to-day.



Closed View.

CENTRAL FUSE BLOCK
LIGHTNING ARRESTERS





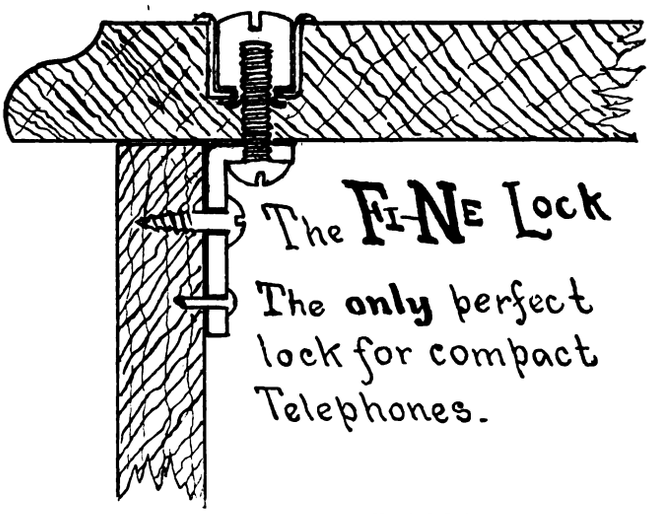
Open View.

Sample Series—4 Bar or 5 Bar Bridging Leader Junior Telephone shipped to any responsible party in the United States on 30 days' trial prepaid freight.

Sample Fuse Block as above sent free on request to any one mentioning this ad.

CENTRAL TELEPHONE & ELECTRIC CO.
2135 Lucas Ave., St. Louis, U. S. A.

The Biggest Little Thing
we ever got up is



Specify the FI-NE LOCK
even tho' you order "other fellows" Phones

Other BIG THINGS are our FI-NE GENERATOR
FI-NE TUBULAR DROP

In fact ALL OUR STUFF IS FI-NE

FISK-NEWHALL TELEPHONE MFG. CO.
Chicago

CONSIDER THE COST

of testing a line when the trouble man has to skin the insulation from the wires, and then compare it with cost of the INSTANTANEOUS test made with a Frankel PATENT TESTING CLIP. With our way there is no delay and no damage to the insulation; therefore MONEY IS SAVED.

Patented Nov. 15th, 1904.

Sample Dozens, $1.50 per Dozen *500 lots, $ .10 each*
100 lots, .11 each *1,000 " .09 "*

FRANKEL DISPLAY FIXTURE CO.
718 Broadway—ELECTRICAL DEPARTMENT—New York.

OUR No. 3 GRADE MARLIN HANGERS

They cost a little more but are cheapest in the long run.
Pure American Hemp three-ply Houseline.
Re-galvanized Hooks.
Pays to buy that kind.

NATIONAL TELEPHONE SUPPLY CO.
1430 SUPERIOR STREET CLEVELAND, O.

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VOLUME XII *SATURDAY, JULY 15, 1905.* *NUMBER 3*

Novel Intercommunicating Apparatus on the S. S. Oceanic

By C. L. Anderson.

THE use of the telephone on shipboard as a means of communication is of but recent date. Formerly the commander on the bridge, communicated with the subordinates in the engine room, and other stations, by means of speaking tubes. However, numerous systems have been devised, which, although not entirely solving the problem, yet have progressed so far as to permit it being said, that the telephone is an assured fact as a means of shipboard communication.

There are many difficulties which lie in the way of its successful operation, however, but, as these are more of a mechanical than an electrical character, it is reasonable to suppose that they will shortly be overcome. Electrical engineers of each country having maritime commerce have devised different instruments, which vary greatly from each other. The accompanying illustration (Fig. 1) depicts a type of marine telephone for communication on board of the White Star steamship "Oceanic." Particular attention is drawn to the first picture, and to the fact that the transmitter and receiver are mounted in parallel in the case. This necessitates a very powerful transmitter and an equally powerful receiver. The construction, however, from this standpoint eliminates the possibility of moisture entering the mechanism, and thus causing the parts to deteriorate. The upper opening is the receiver, and the lower opening the transmitter. They are normally kept closed by a swinging door, which has to be held open when the instrument is in use, to prevent its automatically closing the orifices. To the upper right hand side of the box is a plunger push button, working in piston bearings, which operates the signal bells, one of which is shown above the instrument. Below the telephone box, which, by the way, is made of cast iron, is the switch. This is a novel departure from anything heretofore devised, and its design was necessitated from the fact that to permit automatic arrangement the mechanical exclusion of moisture would be impossible.

Fig. 1. Intercommunicating telephone on the forward bridge of the White Star S. S. Oceanic.

In Fig. 2 is shown a modification of the first design. Besides the earpiece, which is brought out at right angles to the transmitter, there is an additional one, connected by means of an armored, flexible tube. This earpiece is provided so that the officer on the bridge can move around and judge what is going on, and, at the same time, be able to listen and talk. The same automatic closing of the transmitter is effected in this case, as in the former, but, as the entire apparatus is encased in a water-proof box, no means have been provided to cover the receiver openings.

This intercommunication system is used entirely by the executive department of the ship, and has no connection with the passengers' staterooms. It is essentially provided for navigation purposes, and, for this reason, all of the apparatus has been designed from the standpoint of wear and economy, rather than from the standpoint of appearance. The wiring is run in armored conduits, and is amply protected by heavy insulation. Signals between different stations are made over the same line, a code being used to determine which station is required. Thus a single ring may indicate that an officer on the forward bridge is called, two rings the engine room, three rings the after bridge, and so on. It is particularly noticeable that the vibrations of the vessel affect the transmission but slightly. This is due to the mechanical design of the parts, which have been carefully worked out to avoid this difficulty. Another noticeable feature is the small possibility of derangement of the mechanism. There is no receiver shell to get broken, no cords to become short-circuited, and no hook-switch to get out of adjustment.

Fig. 2. Telephone on the after bridge of the S. S. Oceanic. Attention is drawn to the supplementary ear pieces.

The arrangement of the transmitter and receiver is a radical departure from any method heretofore attempted. It is possible to talk and listen at a distance of two feet from the instrument, under all ordinary conditions, which enables the parties using the apparatus to carry on a conversation, and at the same time watch what is going on, to see that orders are being carried out correctly. The cover to the transmitter and receiver closes tightly enough to exclude moisture, and yet can be readily moved by the knob upon its front surface. As the instrument on the after bridge is in an exposed position, its ear pieces are provided with rubber cushions, to exclude all outside noises.

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Intercommunicating Circuits

BY EDWARD A. TYLER.

THE essential features in the designs of circuits for intercommunicating telephone systems, differ largely from those requiring the aid of a central switching station. Inasmuch as each instrument is a central point, from which all others must be reached without the aid of another, the problems

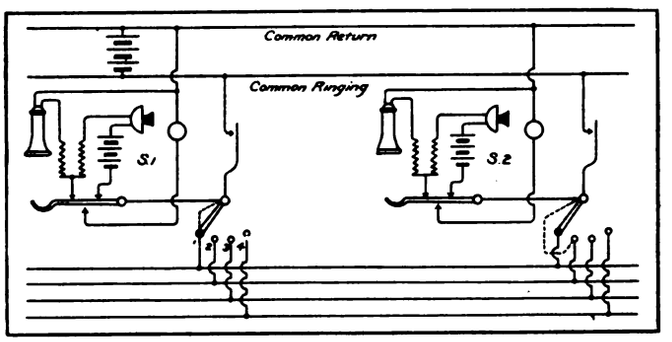

Fig. 1.

in circuit arrangement, which experimenters and designers have sought to solve, have possessed points of intricacy more puzzling than any others in the varied branches of telephone engineering. An analysis of all the different circuit arrangements which have been devised is impossible. First because of the many different situations which have necessitated special schemes, and secondly because the final improvement is yet as far distant as when the first design was executed. Nor is it possible to go into the mechanical details, for, from this standpoint alone, the why and wherefore of all the devises in general use, would well require a volume in answering. It is to be understood therefore, that the accompanying circuits together with their descriptions, are intended only as illustrations of the development along general lines in this branch of the industry.

One of the earliest attempts to operate an intercommunicating system with a centralized battery for ringing, is illustrated in Fig. 1. If the drawing is first examined without reference to the dotted lines, it will be seen that besides the common return line, an additional wire is run called the common ringing. Be-

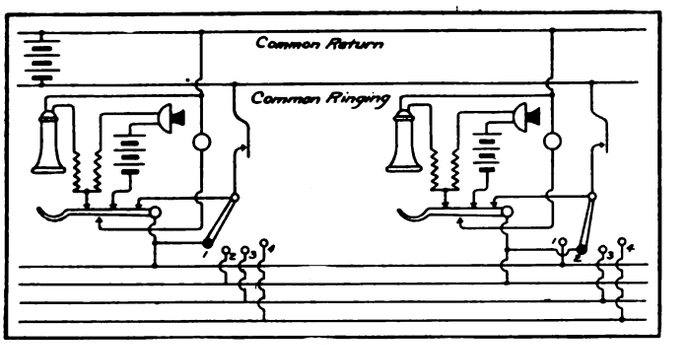

Fig. 2.

tween these two is bridged a battery, the duty of which is to supply current for signaling by means of vibrating bells.

To signal a station, the lever is moved to the desired point and the button pressed. A circuit is then completed from the common ringing wire, through the switch lever of the home station, wire leading to station called, through the switch at this point, hook, bell, common return and battery. The talking circuit is local, and the listening circuit is completed through the common return, and line of the station called. It will be obvious at once that there existed in this scheme a serious drawback to its otherwise ingenious design, inasmuch as it is imperative that the switch levers be kept at their home points, except when calling, otherwise it will be impossible to establish communication, the signaling and listening circuit being open. Another trouble is that if the lever of one station should rest on the point of a line of another being called, that station would receive the signal as well, and thus cause unnecessary confusion.

A relief to the former trouble was speedily devised in the placing of a wire joining the switch-lever to the home point, as shown by the dotted lines in Fig. 1. With this arrangement the position of the lever is immaterial, as far as receiving a call intended for any particular station is concerned, but the trouble of receiving stray calls by its wrong position was not mitigated. The solution to this problem was first obtained by mechanical means. The switch lever being, by an ingenious arrangement, so

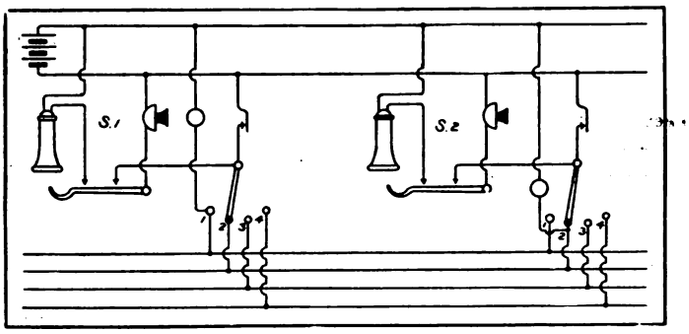

Fig. 3.

constructed with relation to the hook lever, that when the latter is depressed to its normal position, the former is returned to its home point. Several other mechanical means have been tried and suggested, but either from complexity, or unreliability, have not come into general use.

A circuit design which goes a long way toward accomplishing the desired result, is illustrated in Fig. 2. In this arrangement, it will be noted, that the hook switch is directly connected to the line of the home station, and that the wire from the rotary lever switch is run to an additional upper contact at the hook. When the receiver is on the hook, the lever switch contact is open, consequently its position with relation to foreign contact points is immaterial, and the line connection directly to the hook gives a permanent circuit for the bell, when the receiver is on the hook.

One of the most ingenious arrangements ever devised for employing a common battery for ringing and talking purposes is illustrated in Fig. 3. This is known as a a Wheatstone bridge circuit. It will be observed that when the hook switch closes its

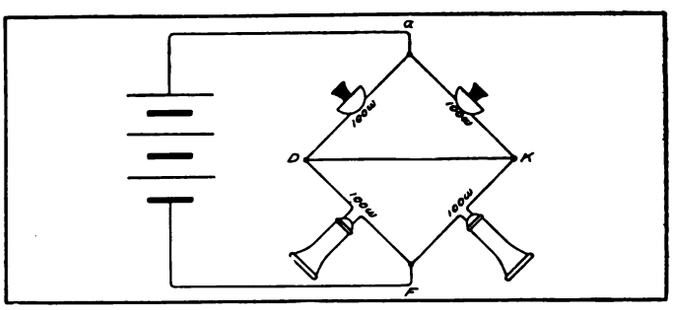

Fig. 3A.

contact, that the transmitter and receiver are bridged in series across the battery mains, and that a circuit is formed from the junction of the transmitter and receiver to the rotary switch. Attention is also drawn to the point, that the bells are permanently connected between the home points and one side of the battery. In operation the system depends entirely upon the principle of a Wheatstone bridge. Suppose for ease in description that station 1 is calling Station 2, the lever of station 1 is placed in contact with the point of station 2; a combination is

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then formed which is the same in general principles to the circuit of a bridge, the transmitters and receivers forming the variable resistance arms. This is diagramatically illustrated in Fig. 3a. Under normal conditions the potentials at the points *D* and *K* being equal, there is no movement of current along the wire *D K*. If, however, the resistance of either transmitter is varied the potentials at the points *D K* will vary, and in consequence there will be a flow of current along the wire *D K*. For example, if the resistance of the transmitter *A K* is raised, the flow of current in the circuit *A K F* is lessened; to maintain an even balance, current will flow from *A D* through *D K*. Thus every variation in resistance of either transmitter is made apparent in both receivers. It will be observed that although signals can be given irrespective of the lever position of the circuit in Fig. 3, yet it is necessary that the switch of the called station should be on its home point, to enable conversation to be carried

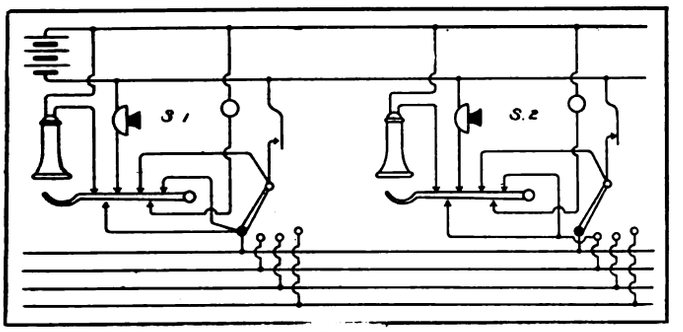

Fig. 4.

on. This difficulty is overcome by the arrangement shown in Fig. 4. The wire from the home point is split into two parts, one forming a lower contact for the hook and completing the bell circuit, the other going to an upper contact which, when closed, permanently connects the talking circuit of the instrument to its own line. It will be readily seen that though this arrangement does not necessitate the return of the lever to its home point, yet if it should rest upon the point of a line in use, it would have to be returned to its home position to enable conversation to be carried on without interference.

The circuit descriptions herewith given, have shown a rotary lever switch as furnishing the means of intercommunication; however, any other scheme will do as well, and as the automatic reset push button mechanism is at present being largely used, a description of one type and its operation is furnished. In Fig. 5 a metal plate *d*, having an overhanging portion *t* is suspended upon pivot points *e*, so that it will hang in normal position with its insulated lower surface *f* pressing against the inner surfaces of the springs *k*. This plate is connected by means of a wire to a hook contact, and takes the place of the ordinary lever. To the rear of this plate is mounted a strip *g* which forms a battery contact for ringing purposes. If any spring is pressed the plate *d* is forced back till a point is reached where it slips over the edge of the spring and returns to its normal position, whilst if the spring is further depressed, it comes into contact with the battery strip *g*, completing the ringing circuit. Upon releasing the button the spring then comes back till its further movement is stopped by the inner surface of the plate *d*, and the talking circuit is completed. If another spring is pressed whilst one is already in the talking circuit, the plate *d* will move backward till

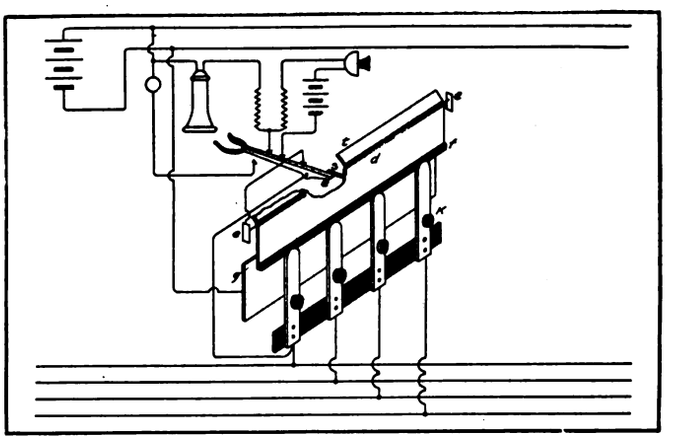

Fig. 5.

a point is reached, when the tension of the spring already in circuit, will cause it to snap back to its normal position. When the receiver is placed on the hook, the buttons are restored to their normal position by means of a lever *e*, mounted on the hook, as shown in the drawing. Midway in the rear of the swinging plate is mounted a rigid bar *s* projecting outwards. As the receiver hook goes down, the lever *e* forces the bar *s* upwards, causing the plate *d* to move backwards till the springs have cleared.

There are many other devices for automatic reset instruments, but in general their operation is similar to the one herewith described, differing only in mechanical details. The essential features of all intercommunicating systems are similar in general details, the only difference being in the means employed to secure the ends.

Suggestions to Contractors Looking for Intercommunicating Business

By R. Emerson.

WHEN going after a prospective intercommunicating contract, a good deal depends upon the arguments that can be brought to bear upon the purchaser. Each case demands some individual points, but in general the following remarks will prove a great help.

"In approaching a prospective customer, the writer has found it advisable to always have a sample of the mechanism or complete instrument and also very nice printed matter that shows the instrument up well and that is not full of technical matter. The busy man will not read the average catalogue material. Some good small pamphlet that shows the instruments up well is most desirable.

"A good point is to first bring out the advantage of 'Time and money saved.' The average establishment has two or three boys running around as messengers; the time consumed waiting for them, and many mistakes are avoided, by having a telephone system, where one can get his party at once and be sure that the message will be delivered intelligently.

"Bring out the point of fire alarm, and that it is a good thing to have in a hundred ways, and can be used in factories, business establishments and banking offices or anything of that sort. The service is instantaneous and also reliable.

"Impress on the prospective customer the number of steps it saves and the time consumed in delivering a message by boy. In one case in New York City, recently, where a telephone system was put in an establishment, three hands were dispensed with and placed on more profitable work.

"Explain to your prospective customer that the cable going in his system of telephones will have three or four more extra wires than the telephones called for on the present system, so that any time he wants to add extra telephones, it can be done with little additional expense. This is important, as when telephones are installed the owners of the systems generally want additions made, as they find how advantageous they are.

"Impress on the customer that you will maintain the system. The telephone system that is put in properly can be looked after

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and maintained at the rate of $1.50 to $2 per year per telephone at a good profit.

"Do not be afraid to put up sample instruments on trial. If you have any confidence in your telephone apparatus, you certainly should not be afraid to put it in on trial. When once installed you have your customer going, as he will never do without the convenience of the system.

"Do good work and you will find that one system will help you get another. Telephone service for factories, apartment houses, hospitals, banks, large office buildings, trust companies, etc., is absolutely necessary in all up-to-date places.

"Get from your manufacturer a pamphlet having references in it, and take it to your prospective customer, and when he gets time he will take it up with you."

These are just a few suggestions. Others will be apparent, but be sure they are right to the point and convincing.

Hints for Installing Intercommunicating Apparatus

By L. S. Smith.

SINCE it is requisite that all the circuits of an intercommunicating system shall be connected to every instrument, the necessary line wiring involved is much more complicated than is the case with private branch exchange installation. Systems a.e operated either with a common return or a complete metallic circuit. As the distance over which transmission is carried is comparatively short, very good results are obtained with the use of the common return or even grounded circuit. In Fig. 1 is shown a diagram of 6 telephones wired according to common return practice. Here the telephones are shown at *a a' a"*, etc., and it will be seen that six separate wires are run to each instrument, the circuits being completed from the other terminals of each telephone through the common return wire. Where the lines average over 1,000 ft. in length, the diameter of the common return wire, should equal the sum of the diameters of each of the separate wires. While with intercommunicating systems, the average length of the lines is considerably under the

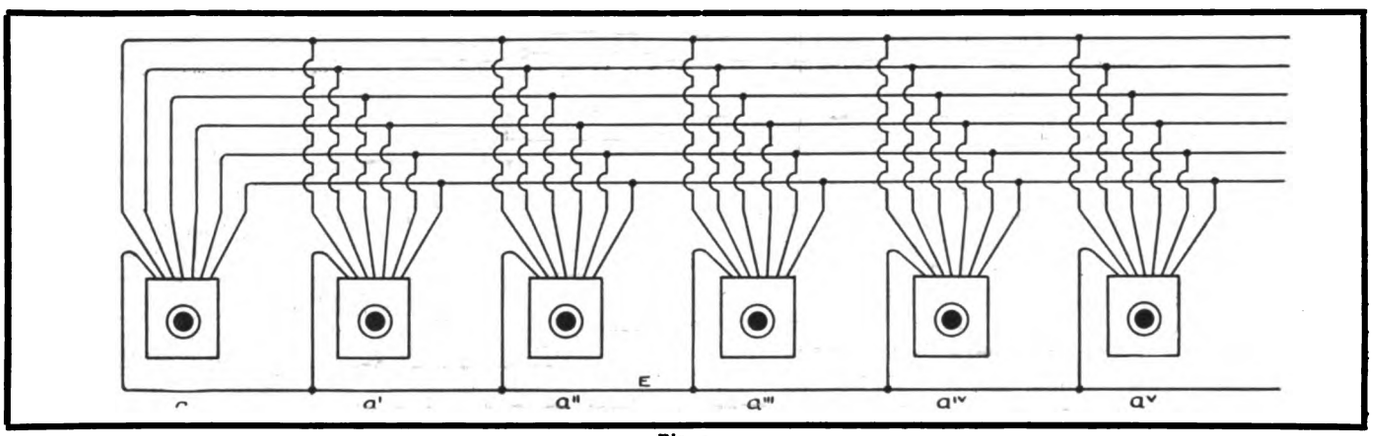

Fig. 1.

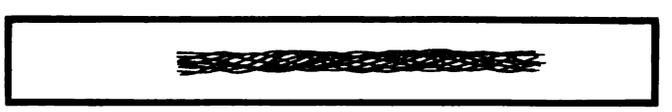

Fig. 2.

above figure, it nevertheless is advantageous to adhere to this rule in ordinary practice.

In general, it is not advisable to use switchboard cable for an intercommunicating system, from the fact that the wires, being twisted together in pairs, would create mutual induction between the two circuits, causing conversation on one line to be overheard by a party listening upon the other. The best plan is to use ordinary house wire, No. 19 B. & S. gauge, with a rubber insulation, and a covering to match the wood work along which it is to be run. Where the wires run in molding the matter of testing out circuits can be greatly modified, if each separate wire has a distinct color or combination. In running these wires, they should be so placed in relation to each other as to not come in contact with each other for more than a short distance at a time. Or, in other words, they should be mutually twisted together so as to lessen the inductive effects, as shown in Fig. 2.

Although annunciator wire is sometimes used, it is not to be recommended, from the fact that the insulation, being so thin, it can be easily damaged, and the moisture will readily permeate it and thus create crosses. In passing through walls, partitions and flooring, the wires should be thoroughly taped to prevent mechanical abrasion. If possible, the holes should be bushed with some insulating material. In passing through brick or stone, a star drill should be employed, which will make holes sufficiently large to allow the wires to readily pass through them. The ends of the holes should be rounded off to prevent cutting effects. Holes in wood should be drilled with a bit large enough to permit the wires to be readily threaded through, and the ends similarly treated as in the case of brick or stone. The wires should be laced as shown in Fig. 3. This holds them together, and adds slightly to the mechanical strength of the cable.

Fig. 4 illustrates the correct method of making a splice and of terminating wires at an instrument. Of course, conditions will arise when this scheme must of a necessity be modified, but the general principle holds goods in every case. Where the number of instruments is very large, a single wire cable can be employed, and if the circuits lie in any place where there is moisture, or where fumes from acids may arise, a lead-covered cable should be employed, having a wool insulation for the conductors. Wool is preferable to paper, because it is much easier to splice; and besides the wool prevents moisture from entering the cable, which would happen if the insulation was paper, unless it was protected with a lead sleeve and a joint wiped in the usual manner. It is absolutely necessary that the forms of splices be boiled

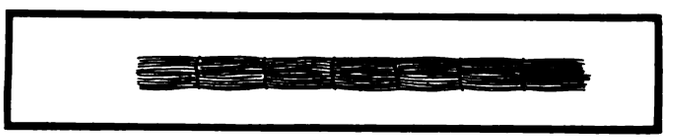

Fig. 3.

out to dispel any moisture which may happen to be retained within, and that the joint is thoroughly taped. If there is any probability of running the circuits through damp places, etc., a rubber insulated wire will serve the purpose, which should be heavily taped. In supporting cable where molding is not employed, leather straps should be used as shown in Fig. 5, or pipe clamps can be employed, which have been covered with a heavy wrapping of tape, to prevent the edges chafing the insulation of the

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SYNOPSIS OF FIFTH ANNUAL CONVENTION OF THE NATIONAL ELECTRICAL CONSTRUCTORS' ASSOCIATION OF THE UNITED STATES.

The convention, together with an exhibit, will be held at the Mechanics' Hall, Boston, Mass., commencing Saturday, July 15, at 7:30 P. M., and closing Saturday, July 22, at 11 P. M. The opening session of the convention will be on Wednesday, when addresses of welcome will be made by F. L. Barnes, for the state association, Governor Douglas for the state, and Mayor Collins, for the city. H. McCleary, of Detroit, will then deliver the annual address, following which will come addresses by leading members of the association, jobbers and manufacturers. An executive session will be held Wednesday afternoon, and the annual dinner that night. Thursday forenoon will be devoted to a session of the association, and at 2:30 P. M. the delegates will board a steamer, for a trip down the bay. Friday will be given up to an executive session, and Saturday to entertaining and sightseeing. A ladies' committee of 30 has been appointed to look after the entertainment of the lady guests of the association. During the week some remarkable exhibitions of electrical phenomena will be given, including the transformation of current of 200 volts to 200,000 volts, which will be the subject of a series of experiments by Mr. Earle L. Ovington.

wires. Where lines are to be run from one building to another in the open air, either water proof cable should be employed; or else, if the number of wires is not too great, it may be run in the regular open air style, with insulators and cross arms. The wire for outside use should, however, be stronger than that used

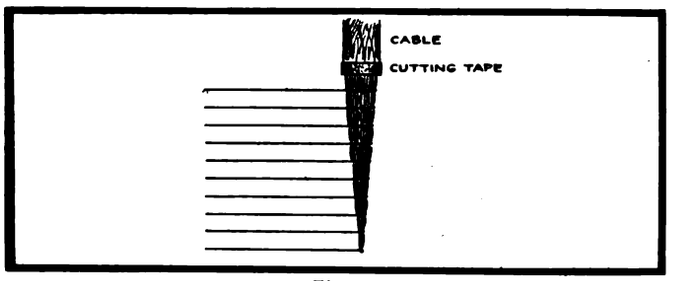

Fig. 4.

for interior, preferably not less than No. 16, which has a tensile strength of 200 lbs. The wires should be insulated, and spans of 175 to 200 ft. are permissible without any fear of their breaking down under ordinary circumstances. Where the wires leave the building holes should be drilled with an upward slant from the outside inwards, and lined with hard rubber bushings,

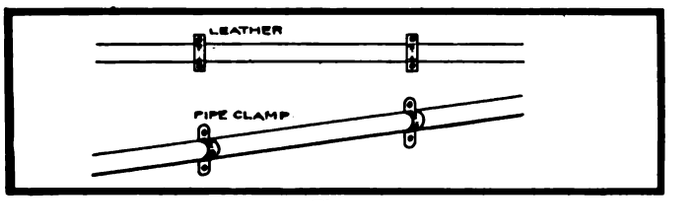

Fig. 5.

reamed out at the ends to prevent abrasion. The wires should be fastened to a wall block, if cable is employed, as shown in Fig. 6, to take up the strain.

If the expense would warrant, it is preferable through factory yards, to run the cable underground between buildings, as this eliminates the possibility of mechanical injury. If lead-covered aerial cable is used, it must be supported by messenger wire, which should be strong enough to withstand the strain, and the cable should be attached at regular intervals, to distribute the weight upon this wire. Where a common return instrument is employed, the common return wire should be placed as near the center of the individual wires as it is possible to get it, in order to nullify the inductive effects, and therefore to reduce the cross talk to as small an amount as possible.

In laying out an intercommunicating system, to save complication, and also for economical reasons, the location of the stations must be carefully determined beforehand, also the run of the wire. It is a very easy matter to eat up a large part of the profits by uneconomical wire runs. This applies as well to the interior as to the exterior runs. The man in charge of the work should thoroughly understand the principle of the instrument that is to be installed, and great care should be taken that every

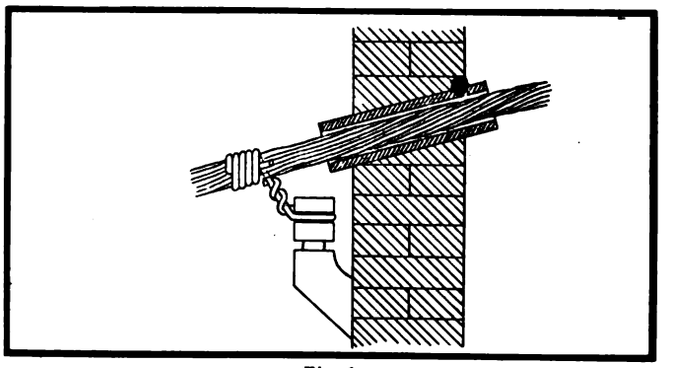

Fig. 6.

piece of apparatus is tested before being sent out, to prevent loss of time in adjusting it upon the work. In running wires it is a good plan to see that suitable tools are employed; because if a man has to waste his time in enlarging a one-quarter inch opening to a half inch, it will readily be seen that the return upon his time will not show any profit upon the job.

In respect to the type of instrument to be used there is little to be said. There are numerous makes upon the market, each of which has its special advantages, which may be eminently suitable to one class of work, and yet not be as satisfactory for another, as some different type. This much can be said, however, and that is, in selecting the apparatus, care should be taken to see that it will do all that is claimed for it.

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IN THE OPERATING FIELD.

BELMONT TELEPHONE SYSTEM AT BELLAIRE, OHIO, PLACED IN SERVICE.

THE Belmont Telephone system, which claims to be one of the finest equipped telephone plants in Ohio, was formally opened to the public at Bellaire recently. Every detail pertaining to the plant is new and the very finest that money could buy.

Less than a year ago the men behind the Belmont Telephone Company, of Bridgeport, purchased the Ohio Valley Telephone Company at Bellaire. The new owners secured an extended franchise from the council and then started to build a new system. They erected a fine three-story central building on Guernsey street at Bellaire, which is to be the headquarters of the company. A partial underground cable system was placed through the business section of the town and for the balance cables were installed. A number of Bellaire business men were interested in the movement and made an active canvas of the city for subscribers and as a result the new company starts off with about five hundred telephones.

KINLOCH TELEPHONE TO EXTEND ITS SYSTEM IN ST. LOUIS COUNTY.

A SYNDICATE in which leading directors and stockholders of the Kinloch Telephone Company are largely interested has purchased a controlling interest in the Suburban Telephone Company, operating in St. Louis county. The deal was closed between the Mississippi Valley Trust Company, acting for the Kinloch interests, and James Houseman, representing the stockholders of the Suburban company. Some of the latter are in the syndicate.

It is stated that the management of the company wanted to extend its field and the deal was made to get in new capital on which to draw. The plans are to increase the capital stock from $100,000 to probably $500,000, and extend the lines all over St. Louis County. H. W. Karrenbrock of Clayton will continue as president of the new company.

WISCONSIN INDEPENDENT COMPANIES VOTE TO CONSOLIDATE.

AN important consolidation of Wisconsin Independent lines was effected at a meeting recently held at Appleton, at which, representatives of the Fox River Valley Telephone Company of Appleton and the Valley Telephone and Telegraph Company of Green Bay and Depere, voted to consolidate the two plants. Representatives present at the meeting state that toll lines connecting all cities of the Fox River Valley and forty-five other points in the eastern and northern parts of the state, with local exchanges at all points, will be in operation under one management by August 1.

NEW INDEPENDENT LINES TO ENTER THE CITY OF MARION, IND.

A PETITION for a franchise for the constructing of a continuation of the Converse Telephone Company's lines was recently presented to the board of public works of Marion, Ind. Attorney S. L. Stricler represented the company, and Oscar Barger, of Converse, a member of the company, was present at the meeting when the petition was presented. The board has taken the matter under advisement.

The Converse Company is an Independent company, which recently lost its connection with the United Company. Its lines extend from Converse as far west as Greentown and Kokomo.

The petition presented to the board is in the form of an unsigned contract or ordinance. It provides the route over which the company is to enter the city.

Some time since this matter was discussed, but the Converse Company did not own any connection with this city, although it did have a possible connection over the lines formerly used by the Wilson-McCulloch company's private wires, connecting the old bottle factory in South Marion with the Wilson-McCulloch plant at Converse.

Since then, however, the Converse people have purchased the private Wilson-McCulloch line and, if the company is allowed a franchise through the city, it will use this line to enter Marion.

MIDDLETOWN, N. Y., COMMON COUNCIL OVERRULES MAYOR'S VETO OF INDEPENDENT FRANCHISE.

THE Common Council of Middletown, N. Y., at a meeting on Monday evening, July 10th, refused to sustain Mayor Hornbeck's veto of the resolution, granting a franchise to the Middletown telephone company, by a vote of six to three. The council passed a franchise, but it is not yet known, whether it will be accepted by the Independent company or not.

BIG BLOCK OF CUYAHOGA STOCK AND BONDS SOLD TO TOLEDO CAPITALISTS.

THE most important financial transaction in the Independent telephone field of Ohio, in recent years, was concluded recently by E. W. Moore, when he sold $350,000 of the common stock of the Cuyahoga Telephone Co., and $428,000 of the company's 5 per cent bonds to a syndicate of Toledo people. The buying syndicate is composed of J. K. Secor, Willard Robinson, Harry R. Ashbrook and others. It is understood that some strong financial men from St. Louis are also quietly interested in the syndicate. The bonds were sold at 86 and the common stock was taken at 20, both quotations being above the market figures. Of the bonds thus disposed of, $128,000 were from the treasury of the Cuyahoga, while $300.000 are the bonds that came out July 1, under the provisions of the mortgage on the extensions that have been made during the past six months by the company. The common stock is to come from the various members of the Everett-Moore syndicate and from the treasury of the Federal Telephone Company.

The transaction is of great importance to the Cuyahoga, as it adds a strong and active financial and business influence to its already effective organization. It also served to greatly stimulate the interest of investors in the securities of the company. Following the announcement of the sale, the bonds at the local exchange rose from 79 to 82½ and were exceedingly active, while the stock rose from 14 to 25 and then reacted to 20½, at which it has remained firm and in good demand. Its par value is $50. The entry of the outside interests in the Cuyahoga will result in the addition of three directors chosen from the representatives of the syndicate that purchased the bonds and stock. The sale represented nearly one-third of the company's stock, but only about one-sixth of its bonds. The stock issue will remain at the same figure, but the issue of the additional bonds authorized by the extensions will bring the issue to $2,700,000. The company's

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earnings are quite enough to take care of the additional charges.

Following the sale the directors of the Cuyahoga met and put the preferred stock of the company on a dividend basis and ordered the accumulated 4½ points paid on July 6. This was sufficient to cause the stock to jump from 44, where it had been selling, to 50, which is par for the shares. The directors also voted to continue the payments on the preferred stock of the United States Company, and the price in the market jumped from 71 to 84¾. The sale of the bonds of the company puts the Cuyahoga in fine financial shape. It not only enables the company to take up its obligations incurred when it put in the large switchboard, but gives it ample funds for all the development work to be done during the present year. This latter item is of great importance, as the development is calling for a great deal of money, and President Dickson is pushing the work with much vigor. Following the announcement the financial statement of the Cuyahoga for May was made public. It showed gross earnings of $47,250.55, an increase from $34,712.23 last year. Surplus was raised from $4,732 in 1904 to $9,655.33 this year.

WABASH VALLEY COMPANY OF EFFINGHAM, ILL., TO INSTALL NEW PLANT.

THE Wabash Valley Telephone Company, of Effingham, Ill., nas commenced to install practically an entirely new exchange, both central office and outside equipment. It now has on the ground 15,000 feet of new cable and is ready to close contracts for a new switchboard and central office equipment. The total expenditure will be in the neighborhood of $16,000. The new switchboard will be of the latest type and will have every facility for giving speedy and dependable service. When the new system is completed it will be in a position to give a greatly improved service.

The company now has its present capacity taxed to the utmost and has about 120 new subscribers to connect, as soon as arrangements can be made to handle them. When all telephones now contracted for are installed, there will be a telephone for every ten inhabitants in the city.

SUCCESSFUL RESULTS SECURED BY PROFIT SHARING PLAN OF CUYAHOGA COMPANY.

THE profit sharing feature of the Cuyahoga Telephone, is proving very pleasant for the hundreds of employes of that company at Cleveland. The distribution is made each six months, based on the earning of the company for the half year period preceding. The plan was introduced for the purpose of inducing the employes to remain peramanently with the company, President Dickson arguing, that a force well organized and experienced, was worth a great deal more to the company, than a force where changes were continually being made. He believed that when the campaign for the development of business was undertaken, there would be a more effective co-operation of all employes, if each understood that he was to share fairly, in the larger profits for which the company was looking. He says the results have more than justified his belief. There has been a hearty co-operation from the employes in all departments, that has not only enabled the company to enlarge its business, but to handle the growing volume with greater satisfaction to the public. The computations for the distribution covering the first half of the year, are now being made at the company's offices. The amount to be distributed will be in excess of $8,000, and will be about one-third larger than any previous distribution. The former distributions have been amounts, about equal to 6 or 7 per cent. increase in salary. There will be more than 9 per cent. distributed in a short time. The distribution includes all of the employes in the various departments, who have been with the company the full six months, from office boy to superintendent.

TELEPHONE TO BE EMPLOYED IN FRANCE TO GIVE CORRECT TIME.

WHILE time signals have been distributed by telegraph for many years and also by wireless telegraphy more recently, it is only lately that use has been made of the telephone for this purpose. The idea was put into practical application in France, where, at the request of the Chambre Syndicale de l'Horologie of Paris, experiments were made by the observatory of the Bureau des Longitudes. The work was so successful in the trials made in Paris, that it was decided to extend it to the whole French telephone system. As the object is to transmit the signals with considerable exactness a verbal signal would not answer, so a microphone was arranged whereby each beat of the pendulum of a standard clock in the observatory could be heard in the receiver. By a prearranged system of omitting a certain number of beats, or other arrangement of the signals, it is possible to identify a given signal as true noon. The method is not only most useful for watchmakers and regulators of chronometers, nearly all of whom enjoy telephone service, but for navigators, who by simply having telephone connection either at the wharf or at an anchorage buoy can regulate their chronometers while in port by an observatory standard. This was done in the case of a French warship at Brest with an accuracy of between .1 and .2 of a second. As it is perfectly feasible to connect any telephone circuit in this way there is no reason why the system should not be widely used.

AN INDEPENDENT MINNESOTA COMPANY HAS A PROSPEROUS YEAR.

ONE of the heaviest years, as far as expenditures of the Nicollet County Telephone and Telegraph Company of St. Peter, Minn., is concerned, occurred last year, and yet after meeting all obligation, it has declared a dividend of eight per cent. to its stockholders on the year's business. The St. Peter system was bought and the first cost of the exchanges which have been constructed at Cleveland, New Sweden and Nicollet, besides a number of rural lines was met. The fact that this company could declare a dividend of eight per cent. after these expenses were met, is ample proof that there is profit in the Independent telephone business.

Few telephone companies can point to results such as have been obtained by this company in the last seven years. In 1898 thirty-three miles of line were built from St. Peter to Winthrop; to-day it is operating eight exchanges and controls 245 miles of wire. Within the last six months, it has absorbed the large St. Peter exchange and that at Kasota, together with their contiguous lines, has established exchanges at New Sweden and Cleveland and in a week or ten days will have its eighth in operation at Nicollet. Its profits since the first of the year have been $3,578.82, the secretary's report showing that the receipts amounted to $5,134.65, while the operating expense was $1,555.83. On its own wires, the company can now serve subscribers in four counties, but it already has orders for as many additional rural lines as can be built this summer and another year will see a material increase in its revenue.

CONTRIBUTIONS SOLICITED

THE AMERICAN TELEPHONE JOURNAL is always in the market for crisp, snappy news or technical contributions. Descriptions of ways to do things telephonic, illustrated with sketches, and also descriptions accompanied by photographs are especially acceptable and will be paid for. Literary skill is not essential, but is, of course, appreciated. Send your sketch, photographs, and write the matter as well as you can. It will be dressed up, if necessary. Here is an opportunity for telephone men from engineers down to ground men to increase their incomes. An article cannot be too technical nor too elementary for us to consider. Articles illustrated with photographs are particularly desirable and will be substantially acknowledged.

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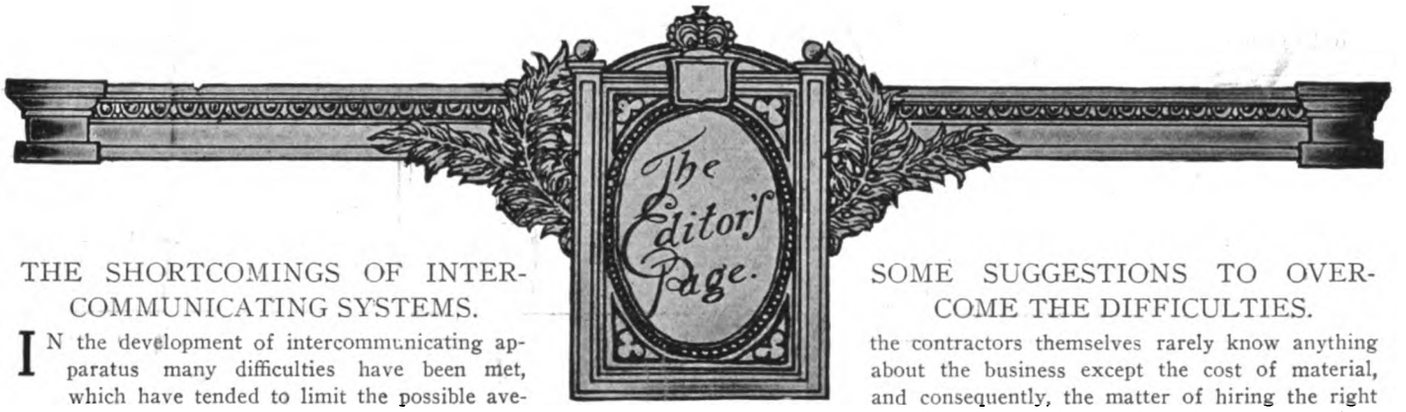

THE SHORTCOMINGS OF INTERCOMMUNICATING SYSTEMS.

IN the development of intercommunicating apparatus many difficulties have been met, which have tended to limit the possible avenues, open to successful operation, and to perfection in electrical and mechanical design. These difficulties have been of a twofold character, arising first from the lack of competent men to handle and install the apparatus, and secondly because the question of price has entered largely into the consideration of the merits of various systems. For these reasons intercommunicating systems have suffered more in reputation than any other department of the telephone field. It is self-evident that a man who has to be jack of all trades is rarely a master of any, and when he does show competency, it will be generally found along the lines of the greatest possible remuneration. As a consequence, the opportunity to install telephone systems being much rarer than opportunities to put in electric lights or bells, or other of the ordinary electrical devices, the men who are capable to handle this type of electrical apparatus are in the minority. Again, where a man is not competent to judge the quality of apparatus, he is most likely to err in consideration of price, and when too late realize the qualities of a gold brick which had seemed to him twenty-four carat fine.

Throughout the country to-day there are intercommunicating plants which, if employing good apparatus, are miserable failures, because when installed the principles which underlie their successful operation were totally ignored. Once burned, twice afraid, is a saying which well fits the feelings of many people who have had intercommunicating systems installed, and, as a consequence, what should have proved a very profitable business is too frequently totally ignored. Yet there is a remedy for this state of affairs, a remedy so simple that any one can understand. It is common sense. If a man installs an electric motor, he generally tries to get one which will fit his requirements best; similarly when an intercommunicating system is to be placed, the requirements of the service should first be examined and the type fulfilling the requirements be used. Not only the kind of instrument, but the method of installation should be most carefully considered, for upon this feature of the work lies its ultimate success. Every building has its own peculiarities, each requiring special attention. Thus when, in one instance, a certain method of running cable would be perfection, in another it would be radically wrong. Attention to details is what counts, and, although it may seem a good proposition to have a continuous revenue coming in for repairs, yet the fellow who is footing the bills has his own opinions, which if communicated to another party desiring a similar plant, might cause him to think twice before exchanging money for a system, which would surely seem only able to return trouble for the investment.

This state of affairs is wrong. The apparatus is to be had, and the right material with which to build systems equally as good as any exchange plant, therefore there is no reason why the opportunities which this class of electrical contracting affords should not be taken advantage of.

The obvious difficulty that is yet to be overcome, is how can the right mechanics be obtained, or how can those at hand be trained in this business so that the work when done will evidence an intimate knowledge of the principles involved. The answer to the first part of this question is difficult. First because

SOME SUGGESTIONS TO OVERCOME THE DIFFICULTIES.

the contractors themselves rarely know anything about the business except the cost of material, and consequently, the matter of hiring the right man is purely a chance, dependent entirely upon the fellow's honesty when stating his ability. To train a man many people look upon as a waste of time, because, the days of apprenticeship being over, the employer is never sure of the continued services of the employee, and even if he is, he rarely has the knowledge, ability or time at his disposal to train him. There is, however, one way in which the desired results can be obtained, and that is by placing at the disposal of the men interested, some of the literature dealing with the subject. There are numerous volumes devoted to the telephone field, besides several periodicals which offer advantages, in the way of knowledge, that is not equaled by any other medium. If a man, no matter whether working for himself or somebody else, wishes to succeed, it is an indisputable fact that he should know his business, and, if perchance he is ambitious beyond the ordinary, the A to Z brand of information is the only kind which will insure the making of money. Many professional men make a practice of keeping clippings of all events or ideas pertaining to their business. It wouldn't be a bad idea for the contractor or mechanic to do the same thing. It is possible to remember but a very small part of what one reads or sees, therefore if one keeps a record of information the time will surely come, when the trouble of doing so, will be amply repaid by the ability to get at the right knowledge at the right time.

OPPORTUNITIES IN THE SOUTH AMERICAN FIELD.

RECENT years have shown a marked change in the habits and business customs of the South American people, and perhaps it is not far amiss to state that, in a measure, this is due to telephone development. The South Americans are notoriously slow, and, although it is now possible to consummate a business deal in practically one-half of the time that was formerly necessary, yet there is still great room for improvement. The telephone has worked wonders in our own country. It should be given an opportunity to do the same thing for the South American.

We have recently drawn attention to small sales made by some of the enterprising manufacturers, but we are still of the belief that this is but a flea bite, as it were, to the possible trade that may be engendered between the two continents. American apparatus possesses originality and mechanical superiority above all others, so there appears to be no reason why American telephones should not be as well known in South America as American locomotives. The opportunities are there, and since the business is as yet in its infancy, to those who take advantage there is a golden opportunity. It must be borne in mind, however, that, slow as the South American may be, yet he well appreciates the value of a commodity; consequently, apparatus that is to meet his requirements should be designed along lines which shall offer the best in mechanical arrangement and simplicity of parts. It would, therefore, be wise before the manufacturer attempts to secure this trade, to analyze the situation thoroughly, and to build a type of apparatus which shall meet with the particular requirements of this locality.

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The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

RAISING TELEPHONE RATES IN OHIO.

THE Supreme Court of Ohio has finally decided the noted case of the Toledo Home Telephone Company and sustains the right of that company to raise its rates. The State, on the relation of the attorney general, brought an action of *quo warranto,* to oust the telephone company from the enjoyment of its rights in the city of Toledo. The facts upon which the case was based were as follows: The company prepared a document in the form of an ordinance which it submitted to the council of the city of Toledo for its adoption. The ordinance presented the mode in which a telephone company might use the streets, alleys and other public ways of the city in the construction and operation of its telephone system. It also contained a schedule of rates to be charged for the use of telephones in business houses and private residences. The rates mentioned were to be as follows: Forty-four dollars per year for each business telephone on an individual wire with metallic circuit, wherever located within the city limits, subject to a reduction of $1 per quarter to be paid quarterly in advance; $26 per year for each residence telephone on an individual wire, with metallic circuit where located within the city limits, subject to a reduction of 50 cents per quarter if paid quarterly in advance. Certain city offices were to be furnished telephones free of charge. This proposed ordinance was never passed by the council and the telephone company, availing itself of the provisions of Section 3461, R. A. V. st., 1892, instituted a proceeding in the Probate Court of Lucas County, for the purpose of having that court determine, in what mode the telephone lines should be constructed along the streets, alleys and other public ways of the city. The rates proposed in the application of the company were adopted in the order made by the Probate Court, prescribing the mode of use of the public ways of the city in the construction and operation of the telephone system. The gravemen of the relator's complaint was that the company had given notice that it would not renew the contract at the old rates but would charge $52 per year for business telephones and $32 per year for residence telephones.

The position of the company was that while it suggested the former rate in its application to the Probate Court, yet the schedule was not binding because that court was without jurisdiction and authority to fix any rate to be charged for the use of telephones. This position was sustained by the Supreme Court. In its opinion the court calls attention to the fact that telephone companies do not depend for their franchise in the streets, alleys, etc., of cities and villages upon a grant from the municipal authorities. The Legislature has directly invested such companies with the right to use the streets and highways for these purposes. The court then examined the statute conferring jurisdiction upon the Probate Court in such cases and held that the court had no authority to prescribe rates.

It was also urged by the relator that the proceeding in the Probate Court amounted to a contract between the company and the city. The court held that this was not the case, as the proceedings in the Probate Court were instituted on account of the failure of the city and company to come to any agreement and that the Probate Court did not act in behalf of the city. The court further held that the company was not estopped from raising its rates nor bound by its representations as to what its rates would be. State vs. Toledo Home Telephone Co., 74 N. E., 162.

LICENSE TAX ON TELEGRAPH POLES.

THE Superior Court of Pennsylvania has decided two cases which have an important bearing upon the right of a borough to impose a license tax upon poles and wires. The first case held that the elements which enter into such license tax are the necessary or probable expense incident to the issuing of the license and the probable expense of such inspection, regulation and police surveilance as the municipal authorities may lawfully give to the erection and maintenance of the poles and wires.

It was held to be proper to permit the company to prove that its line was constructed of the best materials and in the best manner and was carefully maintained in the best physical condition; that it was located in a sparsely settled community and in such a manner as not to endanger or impede public travel; that it was frequently inspected, at least once a month, by an expert employe and immediately repaired if any deterioration was found therein; the cost of such inspection, not as a conclusive test of the reasonableness of the charge imposed by the borough, but as evidence bearing upon that question; and that the borough made no inspection of the poles and wires, and neither paid out any money nor incurred any expense for that purpose. Schellsburg vs. Western Union Telegraph Company, 26 Penn. Superior Court, 343.

In another case the same court held that an ordinance imposing a similar license tax was not void because it was not restricted in express terms to poles and wires maintained upon the highways and public property. The court said it would either presume that such poles and wires were intended or would restrict the operation of the ordinance to them. The company introduced evidence that it spent so much per year in a particular year for repairs and reconstructions, but the court held that this evidence did not overcome the prima facie reasonableness of the tax because the evidence did not cover the whole period for which the license fees were claimed and was not accompanied by evidence as to the nature, extent and costs of the inspection and supervision of its lines which the company gave. Evidence as to the number of poles and miles of wire maintained by the company in the State, the amount of capital stock and bonded debt and net receipts of the company was held irrelevant and immaterial.

The court held that it was proper to reject as immaterial and irrelevant, offers of the Telegraph Company to prove the actual cost or value of its property in the borough; the space occupied by each of its poles; the value of abutting properties and the rate at which they were taxed; the cost of reconstructing the lines through the borough; the ordinary depreciation of such a line and the present value of the line, the license fees imposed by other cities and boroughs. The evidence upon which the tax was held reasonable was a showing that at least once a year the Chief of Police and the Street Commissioner made a tour of inspection, counting the poles and calculating the miles of wire, and that, in addition to this, the officers of the Police Department in connection with their other duties, kept a constant lookout for poles that might be in a dangerous condition and for wires that might be down, and when they found them in that condition, reported it to the proper company. Borough of Kittanning vs. Western Union Telegraph Company, 26 Pa. Sup. Co., 346.

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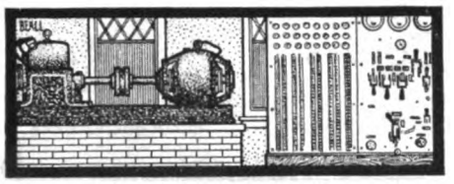
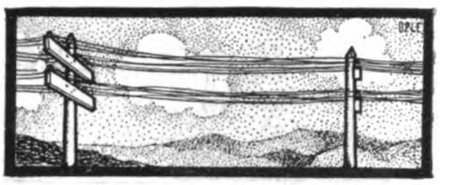


QUERIES

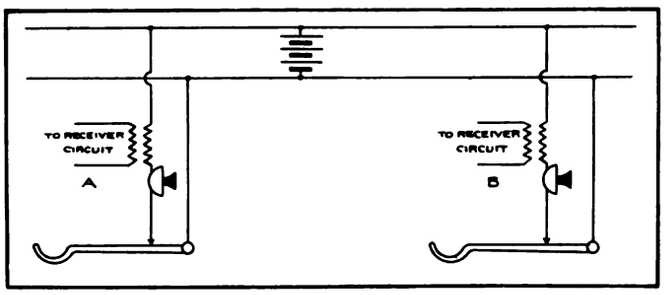
Questions on any subject relating to telephony will be answered on this page.



RETARDATION COIL SYSTEM.—(577.)

Why are retardation coils used in central battery intercommunicating systems? T. R. C.

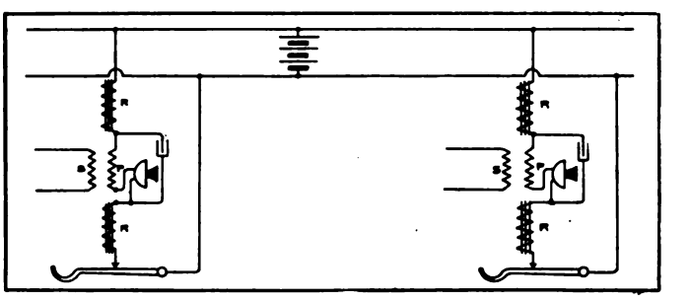
Retardation or impedance coils are placed in multiple with the transmitter circuits of the different stations, to prevent the varying flow of current (due to the changing resistance of the transmitters) being communicated to the battery mains. By examining Fig. 577*a* it will be apparent, that talking into the



577A.

transmitter at *a* will vary the flow of current through its local circuit. Now unless the resistance of the battery mains is negligible and the capacity of the battery excessively large, this variation in current flow will be apparent at *B*, for as the resistance at *A* increases the current flow in that circuit will be diminished and a greater amount will flow through *B*. Contrawise if *A's* resistance decreases more current will flow through the circuit and less through *B*. From this explanation it will be apparent that every fluctuation in either circuit will be apparent at the other and will be communicated to its receiver by means of the induction coil.

Although it is theoretically impossible to overcome the trouble, yet it may be lessened for all practical purposes by an arrangement of retardation coils, as shown in Fig. 577*b*. Here two of these coils are placed in multiple in the transmitter circuits, and



577B.

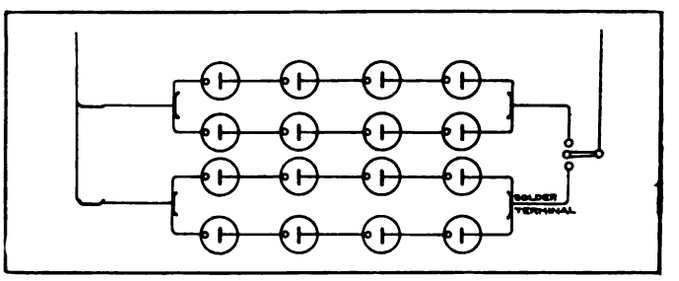
the primary windings of the induction coils and the transmitters are bridged with condensers.

On account of the impedance of the coils *R* the rapidly varying resistance of the transmitter is not able to fluctuate the current across the battery mains, as in the case illustrated in Fig. 577*a*. It will be evident that if the retardation coils impedes or choke the rapidly varying fluctuations through the transmitter circuit, that the functions of the induction coil will be interfered with, therefore, to offset this difficulty the condenser is employed. The object of the retardation coils it has been shown is to maintain an even flow of current through their respective circuits. Now, when the resistance of the transmitter increases the surplus available current will flow into the condenser, and as the transmitter resistance decreases the condenser will discharge. From this it will be apparent that the fluctuations of current through the induction coil are not impaired, and yet the flow of current across the battery terminals at the station is fairly constant. Whatever fluctuations there are, which do pass through the retardation coils at any one station, are further prevented from interfering at another by its retardation coils.

INSTALLING BATTERY.—(578.)

Please show method of installing a common battery for an intercommunicating system and number of calls to be employed. T. S. K.

The installation of a battery and the number of cells to be employed depends entirely upon the system and the location in which it is to be placed. There are, however, some general rules which it would do well to follow. Always place the battery in a dry, cool place, and where it can be readily examined. Excess of battery is as bad as not enough, since it causes the transmitters



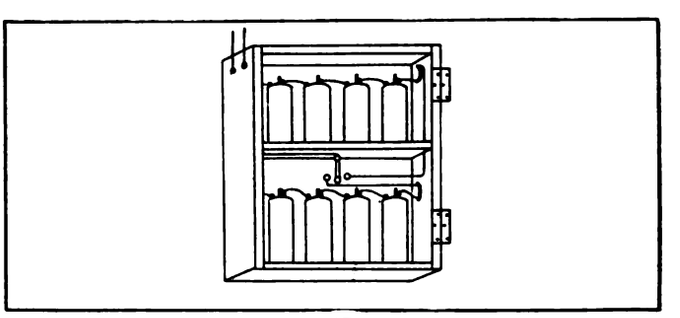
578A.

to burn. A good plan is to employ two sets, and by means of a switch use one set one day and the other the next. In this way the life of the battery is greatly lengthened, and one set is always in reserve in case of emergencies. Always use as heavy wire to connect cells together as is used for the battery mains. When ordinary type carbon cylinder or dry cells are employed, it is better to connect them in series multiple to increase the amperage and reduce the battery resistance. Fig. 578*a* and *b* illustrates a method of connecting and installing a battery for telephone purposes.

CHANGING SYSTEM.—(579.)

I have charge of an intercommunicating plant in a factory. There is a set of batteries for every station, besides a separate one for ringing purposes. To save time and trouble, couldn't all the stations be placed on a similar set of batteries as is used for the bells and thus do away with the local sets at each station? L. ENGINEER.

It would be possible to make the change your suggest, but un-



578B.

less the instruments were entirely rewired and retardation coils employed, you would have much more trouble than at present. The expense would be a figure, and it is doubtful whether it would not be better to install new instruments to meet your plans, than to attempt to reconstruct what you have. This is especially true if you have old type apparatus.

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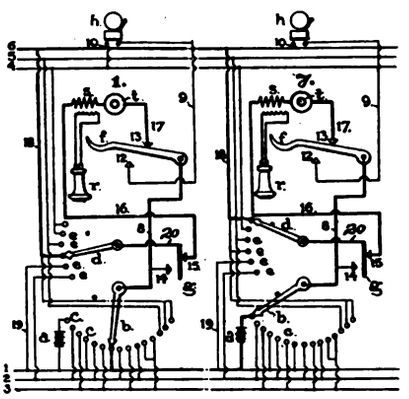
TELEPHONE PATENTS

INTERCONNECTING TELEPHONE SYSTEM.

Albert Koch Andriano, San Francisco, Cal., patents No. 789,350, dated May 9, 1905; filed February 18, 1904, and assigns to the Direct-line General Telephone Company, an improved intercommunicating system. The main feature of this invention are improvements upon a prior patent granted to the inventor and Hermann Herbstult, November 21, 1903, which disclosed means whereby two wires of a number could be selected at will, to form a metallic circuit between two stations. Two rotary switches are provided, the one having the arm *b* and contacts *c* forming the connections to the outgoing lines 1, 2, 3; and arm *d*, and contacts *e* constituting the connecting medium for the



return lines 4, 5, 6. The movable arms are mounted so as to turn about a common axis. It is to be understood that the outgoing lines may serve as incoming lines and vice versa, as desired at the different stations. Where the switches are in their normal positions, the levers are in contact with the home points as shown in station 7. Referring to the drawing, the heavy lines indicate the local circuits of the instrument. When one station 1 wishes to call another 7 the switches are moved into contact with lines terminating at the home points of that station. The strap ~~key *g* is pressed~~ into contact with point 14, and a circuit is then completed from battery *a* of station 7, switch *b*, wire 8, hook *f*, contact 12 (the hook being down), bell *h*, wires 6, 18, switch *d*, wire 20, contact 14, switch *b*, wire 1, back to the other side of the battery *a* of station 7. The talking circuit will be obvious from a careful examination of the drawing.

TELEPHONE SYSTEM.

John G. Roberts, Evanston, Ill.; patents No. 790,854; dated May 23, 1905; filed May 8, 1902; an improved telephone system. This invention relates to an improved central office equipment, whereby substations may be connected together with least possible work of the operator. To accomplish this end, the inventor provides a special form of ringing generator, and an automatic device to limit the time that the ringing current shall be applied to the circuit; also means whereby the ringing current can be automatically disconnected from the line when the called subscriber answers.

SWITCHBOARD CORD.

William J. Burton, Chicago, Ill.; patents 789,652; dated May 9, 1905; filed February 9, 1904; and assigns one-half to Juanita M. Burlingham, of Chicago, Ill.; an improved form of switchboard cord. The object of this patent is to provide a means whereby the end of a cord attached to a plug shall be sufficiently strong and resilent to permit constant bending without breaking or losing its conductivity. It particularly relates to the design of cord patented by the same William J. Burton and Charles L. Burlingham (No. 789,651) and consists of a resilent rod, preferably formed of wire, wound into a spiral with convolutions in close contact, inserted within the convolutions of the conductors of the switchboard cord above referred to.

TELEPHONE CURRENT RELAY.

Herbert G. Shreeve, Newton, Mass., patents No. 791,655, dated June 6, 1905; filed July 8, 1904, and assigns to the American Telephone and Telegraph Company, a telephone current relay. The object of this invention is to provide a means whereby telephone currents on long lines may be reinforced. For this purpose a magnet *M* is employed which has two coils, *m* a magnetizing coil, which derives its current from a local battery, and *n* a varying coil, which is placed in circuit with the telephone lines. *p* is a fixed core and *f* a movable pole piece, to the outer end of which is attached the front electrode *v* of a granular carbon transmitter *V*. The rear electrode *z*, is insulated from the containing case *h*, but connected to the insulated rod *k*, which serves as one terminal of the transmitter, the other being in metallic relation to the base *B*. *J* is a radiating block to dissipate any heat generated in the transmitter during operation. *D* is a hard rubber block to which is attached the magnetic unit *M*. It in turn is fastened to the front of the metal casing *C*, which encloses all the working parts and is placed within the standard *A*, erected upon the base *B*.

The inventor describes four different methods of connecting this device to a telephone line, one of which is illustrated in Fig. 11.

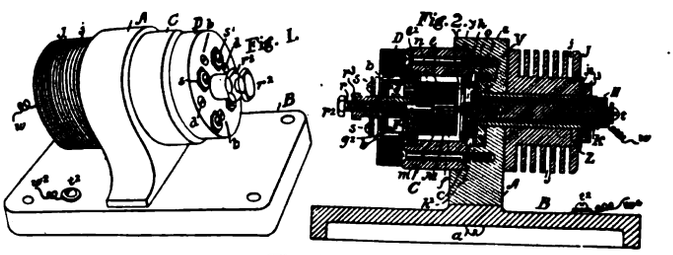
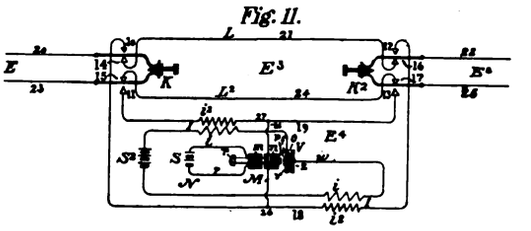


Fig. 11.



To the alternate contacts of keys *K* K^2 are connected wires 18, 19, having in series secondary windings i^2 of induction coils *I I*. Bridged across this circuit is the varying coil *n*. *S* is the battery to supply current for the magnetizing coil *m*, and S^2 furnishes the current for the transmitter *V*. If the keys *K* K^2 are pressed, then the circuit between the distant stations will be made over 18, 19. As a proportion of the telephone currents from either end *E* E^2 will flow through *n*, it will vary the pull upon the front electrode *v* of the transmitter *V*. This will cause fluctuating currents to flow through the primary windings of the induction coils *I I*, and thus reinforce the telephone currents flowing in the main circuits 20, 23 and 22, 25.

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CLEVELAND, OHIO

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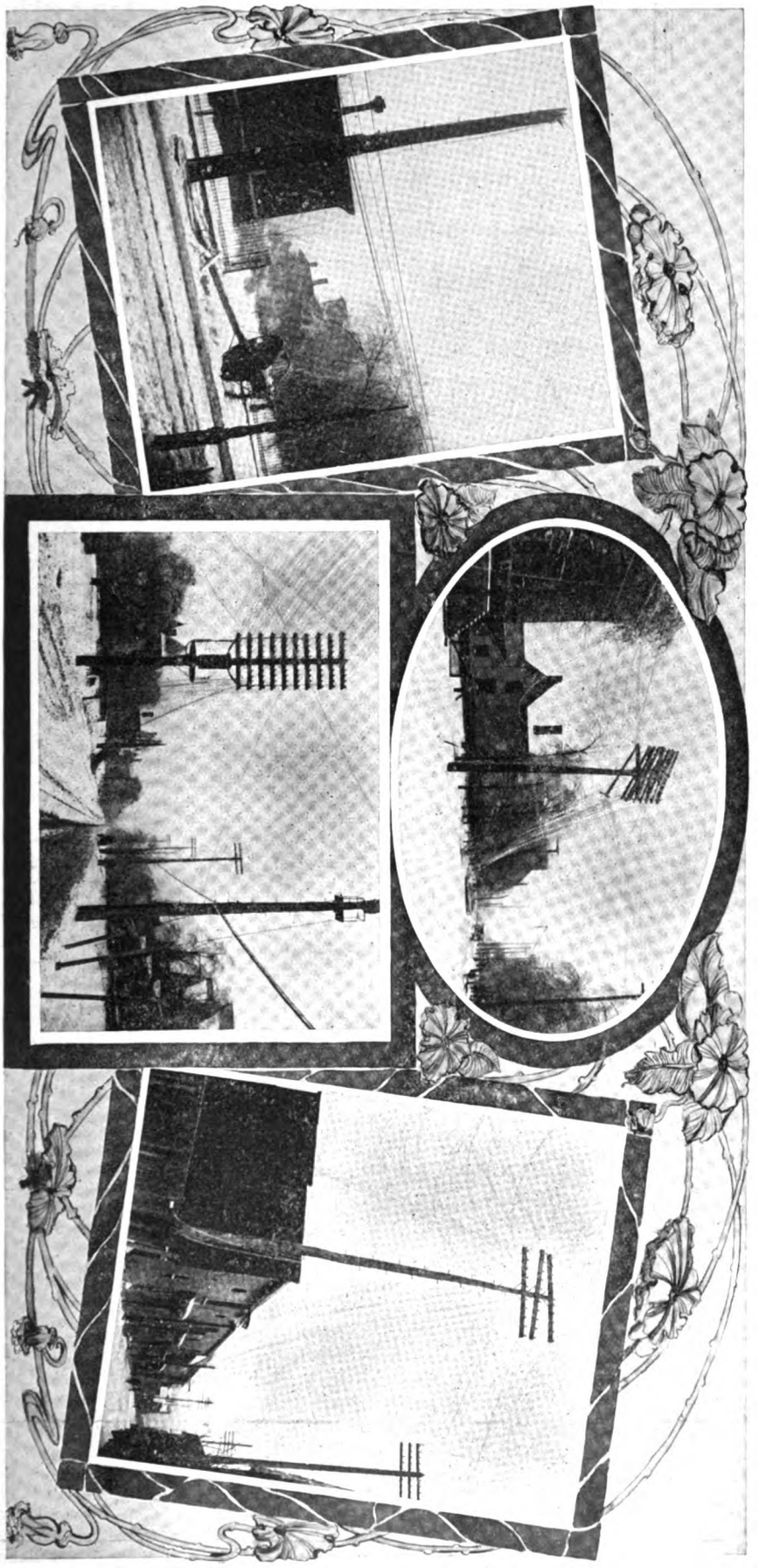
Terrible Devastation by Nature's Elements, Tens of Thousands of Dollars' Worth of Property Destroyed in a brief space of Time

DIVIDENDS WIPED OUT FOR YEARS TO COME

Why not use **The Stanton Open Wireless or All-Cable System,** which is immune from sleet storms? When properly planned and constructed it is cheaper in first cost, far cheaper to maintain, enables you to give better service, costs less for depreciation, and insures greater and regular dividends.



POLES BROKEN AND WIRES DOWN AS FAR AS THE EYE CAN SEE.

Insure your properties against heavy loss by having L. W. Stanton, the Consulting and Constructing Telephone Engineer, of Cleveland and Chicago, place your wires under ground, in accordance with the latest and most approved engineering practice.

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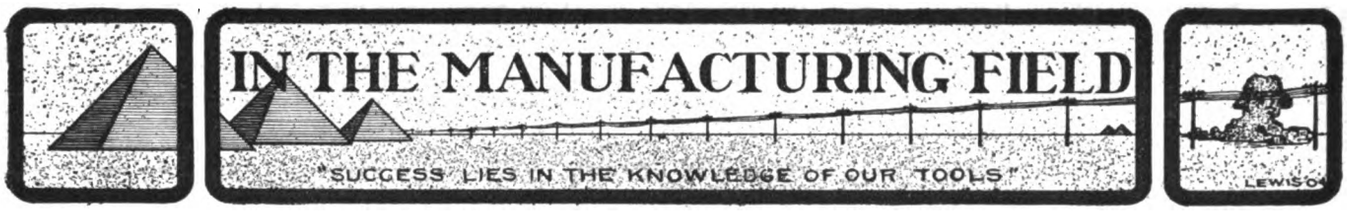

DE VEAU AUTOMATIC TELEPHONE.

AN automatic intercommunicating telephone, which has several points of merit, is being placed on the market by the De Veau Telephone Manufacturing Company, of New York. With this type of telephone, it is possible to call with the receiver either on or off the hook and also to hold a joint conversation with several stations at the same time, by pushing the various buttons of the desired stations. This feature can also be used to serve as a fire alarm, by pushing all the buttons simultaneously, giving one long ring, which is a prearranged danger signal, fire, etc. The desk set is made in the same style as the standard long distance nickel desk set, being metal, with the buttons mounted in the base in a circle.

The wall set is rectangular in shape, as shown in cut, and is equipped with a double row of buttons. The transmitter can be furnished in either the stationary or the adjustable type, and is of the solid back, non-packable type. The receiver is the solid, bi-polar pattern, and is non-destructible.

Fig. 1. De Veau wall type automatic intercommunicating telephone.

An important feature of this apparatus is that the buttons are restored automatically by hanging up the receiver. The mechanism for talking and ringing has two positive rubbing contacts. If so desired this apparatus can be arranged to connect with long-distance systems by trunk lines. All the springs of the apparatus are made of phosphor bronze, the buttons are hard rubber, and are absolutely uniform, being made with diamond tools. The connections are soldered, and insulated with mica. The insulation for the springs is hard rubber.

The circuit wiring for the instrument is tinned, and has two insulations of cotton and one insulation of silk. These instruments are made up for intercommunicating, central office, flat and apartment house systems. Wiring diagrams are packed with each telephone.

The De Vean Company has several pamphlets for distribution, which it will send to parties interested.

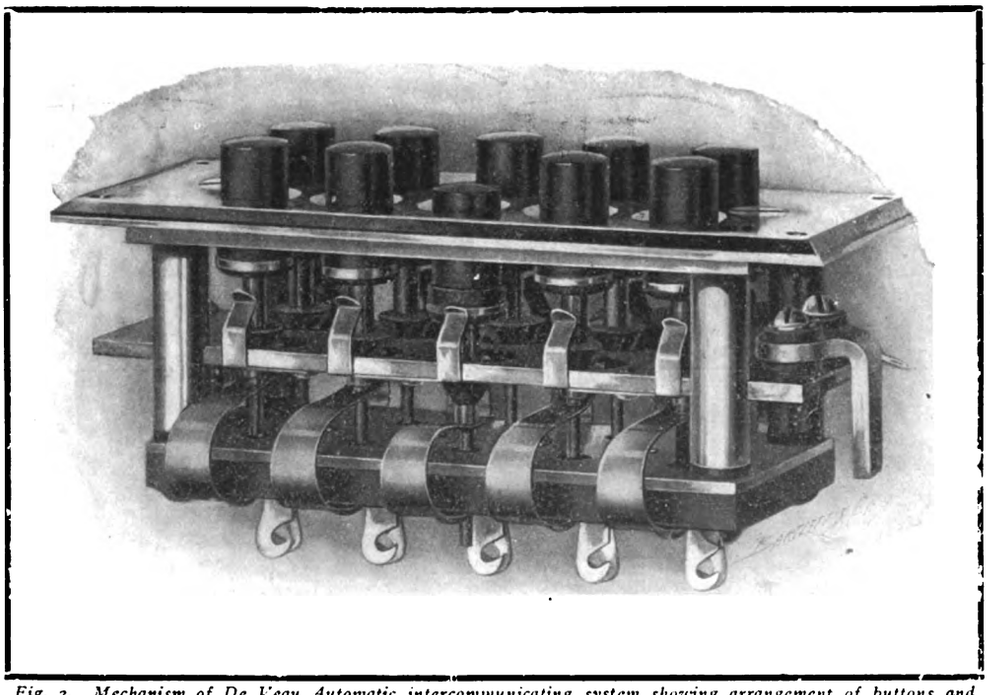

Fig. 2. Mechanism of De Veau Automatic intercommunicating system showing arrangement of buttons and springs.

THE ELECTRIC GAS LIGHTING COMPANY, Boston, Mass., is distributing a catalogue dealing with telephone and annunciator practice, which goes very thoroughly into the matter. We think this catalogue would form a most admirable adjunct to a contractor's literature. This firm is also distributing several bulletin cards, which draw attention to six different classes of instruments. Bulletin No. 12 draws attention to the Rotokoll telephone; Bulletin No. 14 to its flush metal type telephones; No. 15 to intercommunicating telephone apparatus. These bulletins will be furnished to interested parties on request.

THE S. H. COUCH COMPANY, 156 Pearl street, Boston, Mass., is distributing six bulletins, dealing with intercommunicating telephone apparatus and accessories. Special attention is drawn to its battery call instruments, which are made in different styles to suit almost any requirements of service. This firm also handles a complete supply of apparatus for branch exchange equipment, and will be pleased to send its catalogues to parties interested upon request.

THE BAIRD MANUFACTURING COMPANY, of 24 Michigan street, Chicago, Ill., reports that additional orders are being constantly received for its secret service telephone system, which proves that this system is just what telephone companies have needed for a long while. Amongst others who are extending this equipment for lockout and selective ringing ap-

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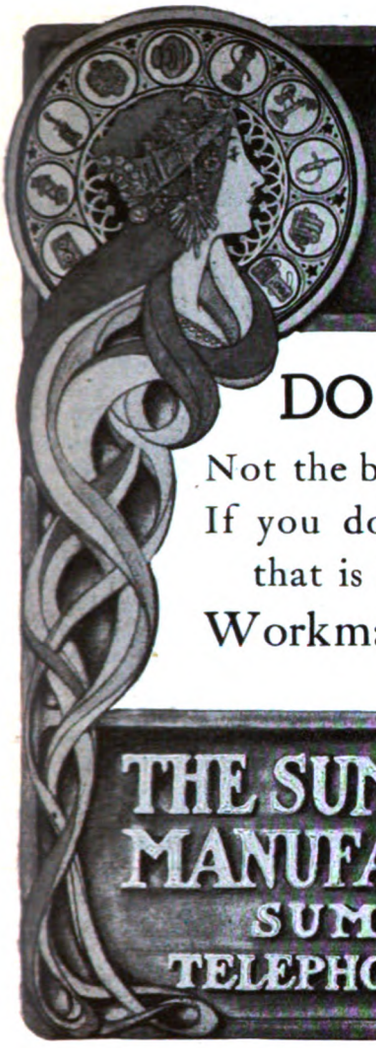

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SOLD ON QUALITY—NOT ON PRICE

DO YOU WISH TO BUY THE BEST?

Not the best telephone at a certain figure, but the best at any price. If you do, there is only one possible make for you to select and that is Sumter. For the best in

Workmanship, Material, Operation, use SUMTER.

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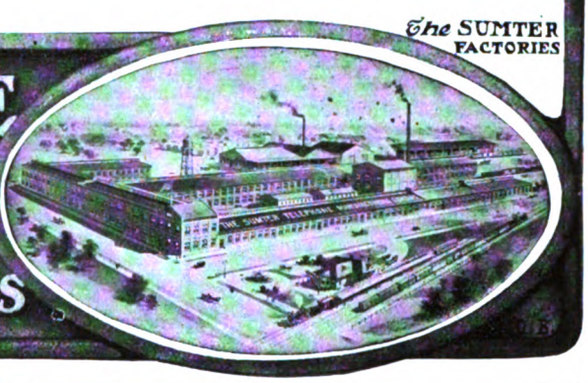
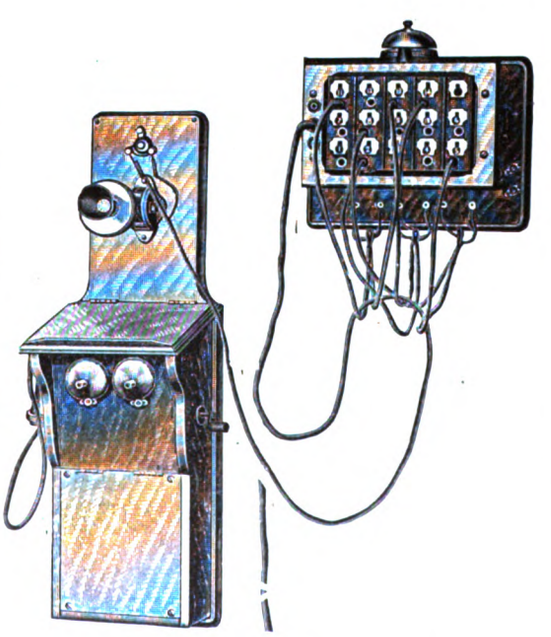


The United Telephone and Switchboard Co.

Succeeding the Gem-mill Telephone & Mfg. Co., recently damaged by fire, have moved into their commodious and modern factory. All apparatus is of the highest grade construction and guaranteed for five years.

If you wish to secure the best possible service you must have the best apparatus. Send for catalogue, prices and sample telephones for inspection and test.



The United Telephone and Switchboard Co. Orrville, Ohio.

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paratus might be mentioned the Home Telephone Company, of Plattsburg, Ohio (users of this system for over three years); the Lincoln Telephone Company, of Lincoln, Neb.; the Williamstown & Owenton Telephone Company, Williamstown, Ky., and the Forreston Mutual Telephone Company, of Forreston, Ill.

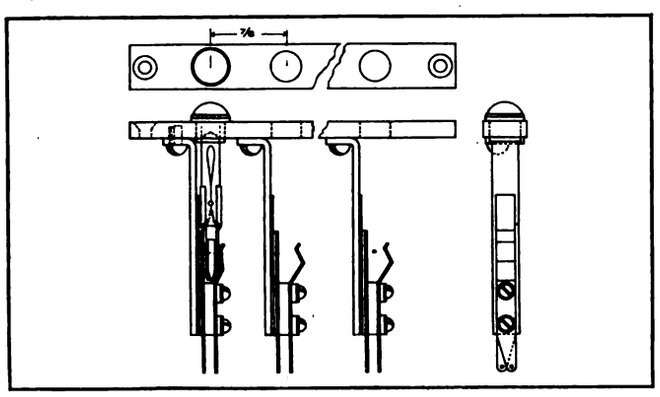
This system practically gives party line telephones two individual wires to the exchange, and eliminates the nuisance of "listening in," so objectionable on party line telephones. The manufacturers claim it to be a wonderful development in telephony, and that it bids fair to revolutionize rural telephone service.

NEW TYPE SWITCHBOARD FOR NAVY DEPARTMENT.

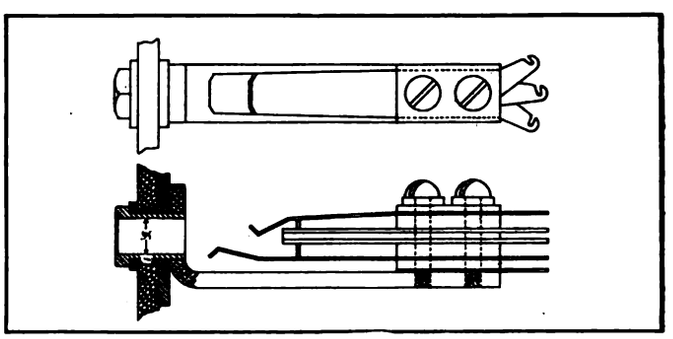
THE U. S. Navy Department has recently purchased a 200-line switchboard from the Lambert, Schmidt Telephone Manufacturing Company, Weehawken, N. J., which has several points of interest. It is designed to operate with both magneto and common battery apparatus. The accompanying illustrations furnish a good idea as to its mechanical design. The operation of the common battery lines is as follows: The subscriber lifts receiver from hook, closing circuit through inside contact of jack and line relay, drawing up armature of relay, which closes circuit through line lamp and night bell relay. Lamp lights, and the buzzer operates, if the night bell switch is closed. Operator answers by inserting answering cord (back) into jack, thus opening inside jack contacts, and the armature of the line relay falls back, extinguishing the lamp and stopping the buzzer. Operator presses listening key and asks the subscriber number of station desired, then puts the calling plug (front) in jack of that line and presses ringing key, which signals the subscriber. When operator inserted answering jack, the supervisory lamp of that cord did not light, as the circuit was closed at sub-station instrument, which caused the cord relay to be actuated, opening the lamp circuit. But when the calling cord was inserted the supervisory lamp lit up, as the circuit was open at the subscriber station. When subscriber at this station takes receiver from hook the light of that cord is extinguished. When conversation is finished, the subscribers hang up receivers, and both supervisory lamps light up.

Lambert Schmidt 200-line combined common-battery and magneto switchboard.

The operation of magneto lines is as follows: When sub-station rings in, line relay is operated and closes circuit of line lamp through inside jack contacts and second winding of relay. This second winding of the relay is to hold up the armature after subscriber has stopped ringing. When the operator inserts plug in jack, the contacts are opened and the relay falls back. The cord operation is the same as in the common battery lines. When the subscriber rings off, line relay is again actuated, and closes circuit through the second winding and sleeve of the jack and supervisory lamp, and when operator takes down plugs it breaks the circuit at sleeve, and the lamp is extinguished. When the magneto lines ring in, a short ring is sufficient to move the armature of relay, which will then stay in the signalling position, as explained. If the ringing is continued until after operator has inserted plug, it will cause the supervisory lamp to also light up, hence instructions must be issued in ringing in from these lines that the generator should be given but a few turns.



Detail of lamp Jack mountings for Lambert Schmidt board.



Arrangement of Jack springs and contacts of Lambert Schmidt switchboard.

W. H. CRUMB & Co., engineers and contractors, 1263 Monadnock Building, Chicago, have been awarded the contract for building and equipping the telephone lines for the Government to be used in connection with the Minidoka (Idaho) irrigating project.

THE AMERICAN CLOCK COMPANY, Chicago, Ill., is issuing a leaflet relative to its electric synchronising clocks. This system permits any number of clocks to be placed upon a circuit having synchronising attachments, and connected to telephone lines. These clocks are corrected every twenty-four hours by an elec-

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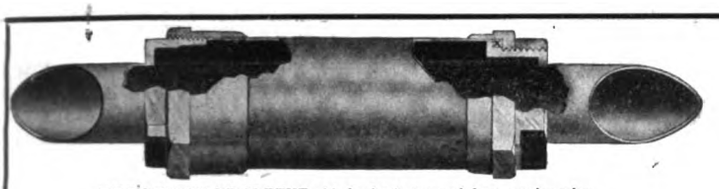

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Splices and Pot Heads

Can be made by any man who can handle a soldering iron, better and cheaper than by any lead joint wiper. And tho' absolutely permanent, they can be opened at any time for inspection or repair and again restored. How much money would this have saved *your* exchange. Details in Catalogue 125-A.

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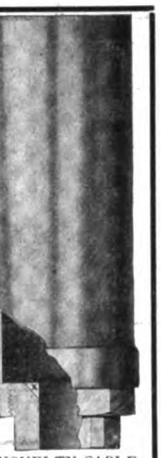

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Our Winner!

SIX BAR No. 14 PHONE

We Make 3 BAR 4 BAR 5 BAR and 6 BAR TELEPHONES

You run no risk by ordering one or more of our telephones on 30 days' trial. If not satisfactory, can return at our expense. Guaranteed for 10 years.

GREAT ADVANTAGE

in using our Six-Bar 'Phone. Will ring through heavy grounds and leaks on the line when other generators would not ring a single bell. Our prices are right. Send us a trial order. 'Phones and Line Supplies.

FARR TELEPHONE & CONST. SUPPLY CO.
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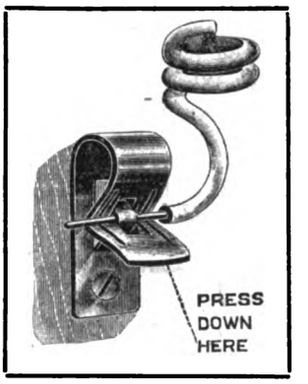
REMEMBER



Batteries cost no more when equipped with the Fahnestock Spring Binding Post than with the old style Screw Post.

Let us send you a sample. It's free.

Fahnestock Transmitter Co.

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DESIGNED RIGHT MADE RIGHT WORK RIGHT

Low Charging Voltage

Proof Against "Sulphating"

Most desirable and satisfactory battery for telephone work ever constructed.

General Storage Battery Co.
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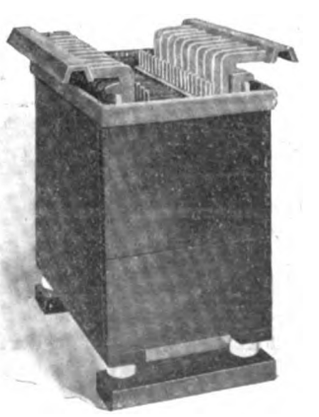

Please mention THE AMERICAN TELEPHONE JOURNAL when writing to ADVERTISERS.

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tric self-winding master clock at the exchange. The synchronizing operation consumes but two minutes, and can be arranged to occur at any desired time. The company points out that this system would produce a large revenue to any telephone company with a minimum of additional expense in maintenance upon the telephone lines.

NEW FORM OF LOCKOUT APPARATUS.

THE Watkins selector and lockout manufactured by the Farr Telephone & Construction Supply Company, of Chicago, is fully covered by patents Nos. 677,724, issued July 2, 1901; 695,976, issued March 25, 1905; 728,147, issued May 12, 1903; 753,183, issued February 23, 1904, together with four other patents allowed. The selector mechanism is shown in Fig. 1, and the circuits in Figs. 2 and 3. When the selector is at normal the short plug in the wheel connects the two contact springs, which enables any subscriber on the line to ring the central office, but, as all the telephone ringer coils are out of circuit, no other party receives the or a direct current generator, each pulsation moving the wheel one notch. The selectors can all be returned to their positions by one pulsation of the current in the reversed direction. The instant reset of the selector, which makes it quick in operation, is considered a novel feature of the invention. The selector can be readily attached to any telephone using an alternating current generator for signaling, and by using a combined direct and alternating current generator at the telephone, the selector will make a complete automatic system, enabling as many telephones to be placed on a line as desired. Any telephone can call up any other on a line by working the selector wheel around with direct current until the long plug makes contact with the three springs, then ringing with alternating current. Fig. 2 shows a metallic line with central office switches and one telephone equipment, with a selector installed. Fig. 3 shows a grounded line with central office switch and telephone and selector installed. Further information respecting this apparatus, together with catalogue, will be furnished on request.

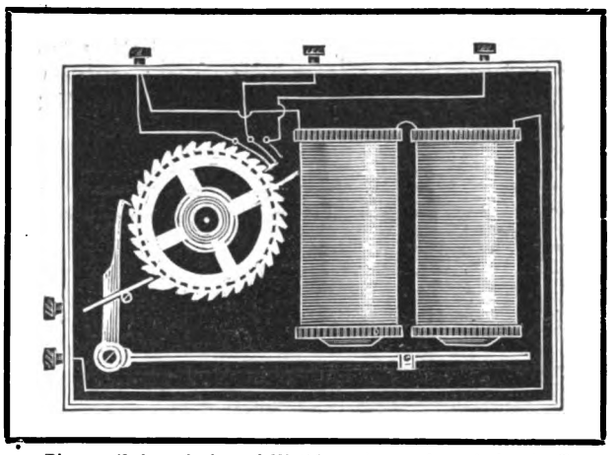

Fig. 1. Enlarged view of Watkins selector, for sale by the Farr Telephone and Construction and Supply Co., Chicago.

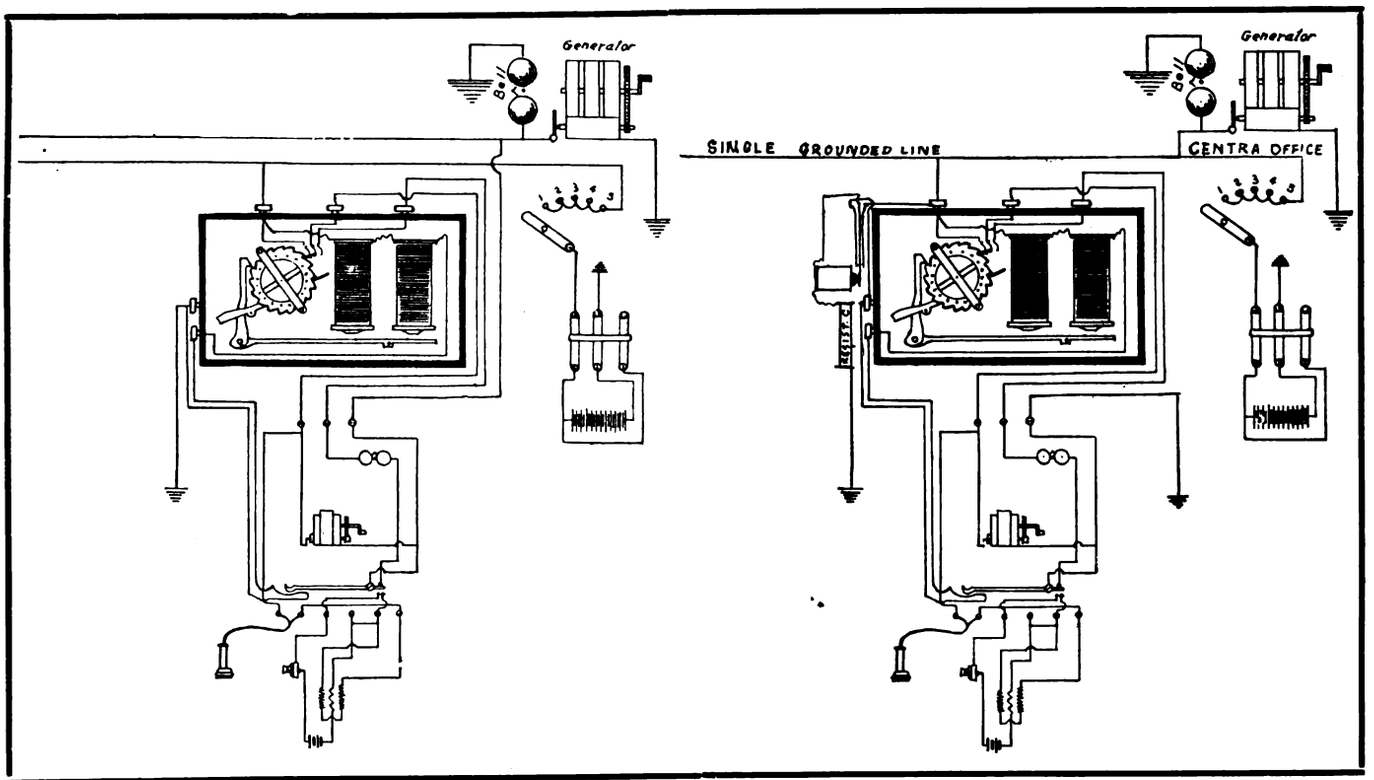

Fig. 2. Exchange and sub-station circuits of Watkins selector for metallic lines.

Fig. 3. The Watkins selector apparatus applied to grounded line circuits.

signal. When the central office operator actuates the selector wheel, it moves around until the long plug makes contact with the three springs, cutting in the ringing and talking circuits. As the long plug is placed at different positions upon the wheel, it is evident that any station desired can be placed in circuit, while the others remain open. This selector can be operated with battery

G. M. GEST, the expert subway contractor of New York and Cincinnati, has just been awarded a large contract in New Orleans for the extension of the subway system of the Cumberland Telephone & Telegraph Company. This is an extension to the original system which the same firm installed several years ago.

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BE CONVINCED. ORDER ONE

PROBLEM

Inferior Cabinet Work, Poor Design — Good Generators, " Transmitters, " Receivers — Inferior Engineering Ability. Haste, Inferior Mechanical Skill. Complications = POOR TELEPHONES

SOLVED

Cabinet Work the Best, Neatness in Design — Good Generators, " Transmitters, " Receivers — Engineering Ability, Mechanical Skill, Simplicity, Durability = MODEL TELEPHONES

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Send us trial order; the proof will be absolute.
Remember the trial costs you nothing; we pay expenses.
Plant not paying dividends? How queer! Haven't you heard of our selective system? Only system that selects over unbalanced lines. "Write us for circulars."

It's up to you to investigate
And learn how nicely it will operate;
This selective system a dividend will pay
And keep the trouble man's hair from turning gray.

Address all communications plainly with street and number.

MODEL ELECTRIC CO. **BURLINGTON, IOWA**
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Sole Manufacturers of Model Selectives, Bridging and Series Telephones

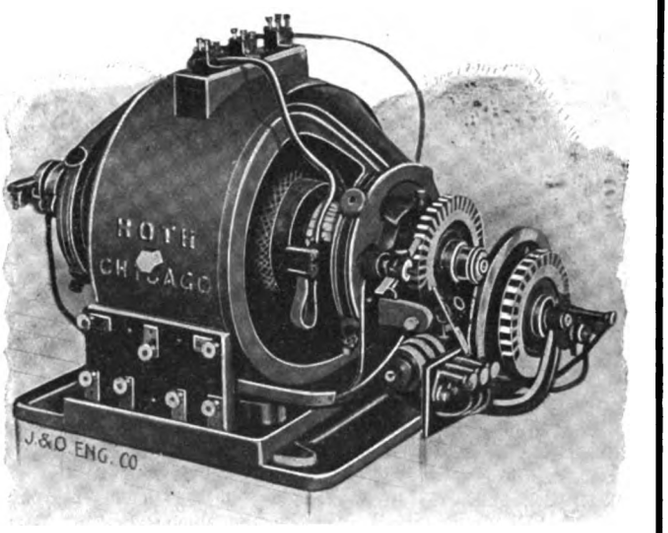
The Mogul

Head-Band Receiver

This is the one you will ultimately adopt. Try it now. We have not the space to argue, but a sample will present a dozen convincing facts. Write us.

Agents wanted to sell our farm line goods.

Cadiz Electric Co.
1 C.C.C. Bldg., Cadiz, Ohio



REASON it out for yourself, and you will find that if
OTHER manufacturers claim as much for their Power Apparatus,
THAT their prices are 'way out of proportion with ours;
HENCE if you need the best at the right figure,

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We design and manufacture motors, generators, ringing machines for either alternating or direct current, tone and busy test apparatus. Send for catalogue.

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Send your orders for your requirements to us and receive the benefit of a large and complete stock of all kinds of telephone construction material, assuring prompt shipments at the lowest possible price.

MONARCH ELECTRIC & WIRE CO.

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THE WEEK'S MESSAGES

FINANCIAL.

LOS ANGELES, CAL.—The Home Telephone Company has increased its capital from $3,000,000 to $6,000,000. It is proposed to issue $3,000,000 additional common stock, and to make the $3,000,000 first issued preferred. The money will be spent in increasing the company's lines.

REDDICK, ILL.—The Reddick Mutual Telephone Company is to increase its capital stock from $5,000 to $10,000. Connections will be made with the line running into Dwight.

INDIANAPOLIS, IND.—The directors of the Indianapolis Telephone Company have declared the regular quarterly dividend of 1 per cent. on New Telephone, long distance stock, payable July 1.

MINNEAPOLIS, MINN.—Public subscriptions will be received by the Tri-State Telephone & Telegraph Company for its preferred stock. The ninth quarterly dividend of one and one-half per cent. is due and payable on this stock Sept. 1, 1905.

BUFFALO, N. Y.—The Independent Union Telephone Company has recorded a mortgage of $500,000 to the Knickerbocker Trust Company.

FRANCHISES.

NAPA, CAL.—The City Council has been requested by L. T. Hayman, representing a new Independent company, for a fifty-year franchise in Napa.

CALDWELL, IDAHO.—W. J. Twillhill, of Boise, has secured a franchise in Caldwell to build an exchange.

EVERETT, WASH.—The Farmers' Mutual Telephone Company has applied for a franchise in Everett.

ELECTIONS.

CANANDAIGUA, N. Y.—At a recent meeting of the People's Telephone Company the following officers were elected: President, H. W. Blake; vice-president, John Litzendorf; secretary, George B. Hemenway; treasurer, G. R. Granby.

PENN YAN, N. Y.—At the annual meeting of the directors of the Crosby & Barrington Telephone Company, the following directors were elected: Isaac Crosby, T. W. Windnagle, James K. Thayer, Howard Fullager, Herbert C. Overshine, Charles E. Guile. Immediately after the election of the above directors, the following officers were elected for the ensuing year: President, Charles E. Guile; vice-president, Howard S. Fullager; secretary and treasurer, Herbert C. Overshine.

STITTVILLE, N. Y.—The Oneida County Rural Telephone Company has elected the following officers: President, E. W. Jones, of Holland Patent; vice-president, G. D. Thomas, of Floyd; secretary, L. G. Wills, of Holland Patent; treasurer, John E. Jones, of Holland Patent; general manager, Ellis D. Jones, of Stittville.

NEW COMPANIES.

BLOOMINGTON, ILL.—The Kinloch, Bloomington Telephone Company has been incorporated with a capital stock of $500,000. Incorporators: R. E. Williams, H. F. Farwell.

GRANITE, IA.—The Granite Telephone Company, Granite, Lyon County, Ia., has been incorporated with a capital stock of $1,600. Incorporators: J. M. Lynch, Wm. Grotewold, D. F. Billings, Len Moeller and Robert Wills.

OTO, IA.—The Farmers' Mutual Telephone Company, of Oto, has been incorporated with a capital stock of $10,000. President, John Hilfiker; vice-president, C. C. Allman; secretary, H. P. Simmons, and treasurer, L. L. Pearce.

WELLINGTON, KAN.—The Mutual Telephone, Engineering and Supply Company, of Wellington, has been granted a charter; capital stock, $5,000.

LYNN GROVE, KY.—A new telephone company has been incorporated here with $2,000 capital stock.

CHIHUAHUA, MEXICO.—O. Sartorius, general manager of the Mexican General Supply Company, is organizing a company at Chihuahua, to be known as the Compania Telefonica La Internacional S. A.

DEERWOOD, MINN.—The Deerwood Bay Lake Telephone Company has been incorporated. Incorporators: O. C. Coffin, of Deerwood, and H. J. Hague, A. N. Gray, A. A. Miller and David Archibald, of Bay Lake.

INTERNATIONAL FALLS, MINN.—International Telephone Company, of International Falls, Minn., has been incorporated with a capital stock of $50,000. Incorporators: E. W. Backus, W. F. Brooks and others of Minneapolis.

RICE, MINN.—The Appolo Telephone Company has been incorporated at Rice, Minn.

HALLAM, NEB.—The Old Farmers' Telephone Company has been incorporated with a capital stock of $25,000. Ed Lauterbach, president; Chris. Keller, secretary; A. L. Axthelm, vice-president; J. Schwaninger, treasurer.

ADVANCE, MO.—The Castor Valley Telephone Company, of Advance, has been incorporated wtih a capital stock of $3,000. Incorporators: J. M. Watkins, C. A. Schonhoff, Nathan Lloyd, M. W. Ireland and others.

MARCELINE, MO.—A telephone company has been organized by R. L. Wheeler, R. R. Smith, John Crowder and W. N. Wheeler, of Marceline.

EAGLE BRIDGE, N. Y.—The Lake Champlain Telephone Company has been incorporated with a capital stock of $250,000. Directors: H. E. Hawley, Albany; F. W. Story, Boston; O. O. Dennis, Whitehall, and E. D. Raymond, Fairhaven, Vt.

ELLICOTTSVILLE, N. Y.—The Ellicottsville Home Telephone Company of Ellicottsville has been organized.

FULTON, N. Y.—The Patron's Telephone Company of Fulton has been incorporated with a capital stock of $25,000. Directors: G. D. Adams, L. D. Beardsley and others.

OLIVE, N. Y.—The Olive Telephone Company of Olive has been incorporated with a capital stock of $500. Frank Roose, J. V. Herrihew and Granville Davis of Olive Bridge are among the directors.

SYRACUSE, N. Y.—The Independent Telephone Company of Syracuse has been incorporated with a capital of $1,000,000 to operate telephone lines in Syracuse and the cities, towns and villages in Onondaga and sixteen other surrounding counties in Central New York. The directors are: Jacob Amos, of Baldwinsville; J. J. Cummins, Gates Thadmeimer, A. D. Hiscock, Alexander H. Cowie, C. M. Warner, of Syracuse; Eugene Satterlee, Pittsford; T. W. Finueane, G. R. Fuller, F. W. Zoller, C. F. Lamb, Rochester.

UNION SPRINGS, N. Y.—The Woodworth Telephone and Telegraph Company has been incorporated with a capital stock of $15,000. Directors: H. Woodward, O. J. Spencer, A. M. Sekell and others.

WEEDSPORT, N. Y.—The Weedsport Telephone Company, Weedsport, N. Y., has been incorporated with a capital stock of $20,000. Incorporators: C. S. Caywood, N. F. Durston and George R. Nash, all of Weedsport.

FAITH, N. C.—H. C. Farmer, L. A. Raney, A. B. Goodman, J. H. Lyerly and J. B. McCombs have organized a new telephone company at Faith.

HOLGATE, O.—The Holgate Farmers' Mutual Telephone Company of Holgate has been incorporated.

JACKSON, O.—The Citizens' Telephone Company of Jackson has been incorporated with a capital stock of $4,000. Incorporators: C. A. Dyer, E. W. Brook, J. Lewis, R. E. Swaney and C. C. McGinnis.

MONROE, O.—The Killbuck Telephone Company has been incorporated with a capital stock of $1,500. Incorporators: A. Thompson, L. A. Foster and C. A. Sauber.

MORRISTOWN, O.—The Morristown Telephone Company has been incorporated with a capital stock of $3,000. Incorporators: R. M. Eaton, W. T. McCreary, John Jeffrey, A. K. Orrison and William Shepherd.

BOOGE, S. D.—The Rock & Minnehaha Telephone Company has been incorporated with a capital stock of $2,500. Incorporators: Thomas Thompson and others.

EDGEMONT, S. D.—A new telephone company has been organized at Edgemont with a capital stock of $5,000. Arthur Colgan, president; H. Godard, secretary; J. Waldron, treasurer.

CENTERVILLE, S. D.—The Centerville Rural Telephone Company of Centerville, S. D., has been incorporated with a capital stock of $25,000. Incorporators: W. E. Ege, Marvin Carlson, G. A. Anderson and others.

NORTH FREDERICK, VA.—The North Frederick Telephone Company, Lew, Frederick County, Va., has been incorporated. Incorporators: S. E. Brown, president; L. Jackson, vice-president and secretary and treasurer, both of Lew, Va. Capital stock, maximum, $1,000; minimum, $300. Objects and purposes: To operate a telephone line.

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Kellogg Switchboard and Supply Co.

CHICAGO, ILL.

Wholesalers of Michigan White Cedar **POLES** *of* QUALITY

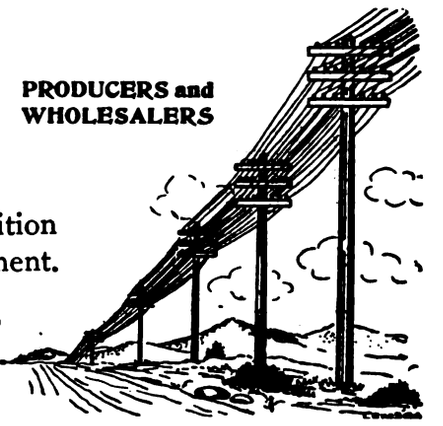
Five Yards *Prompt Shipments*

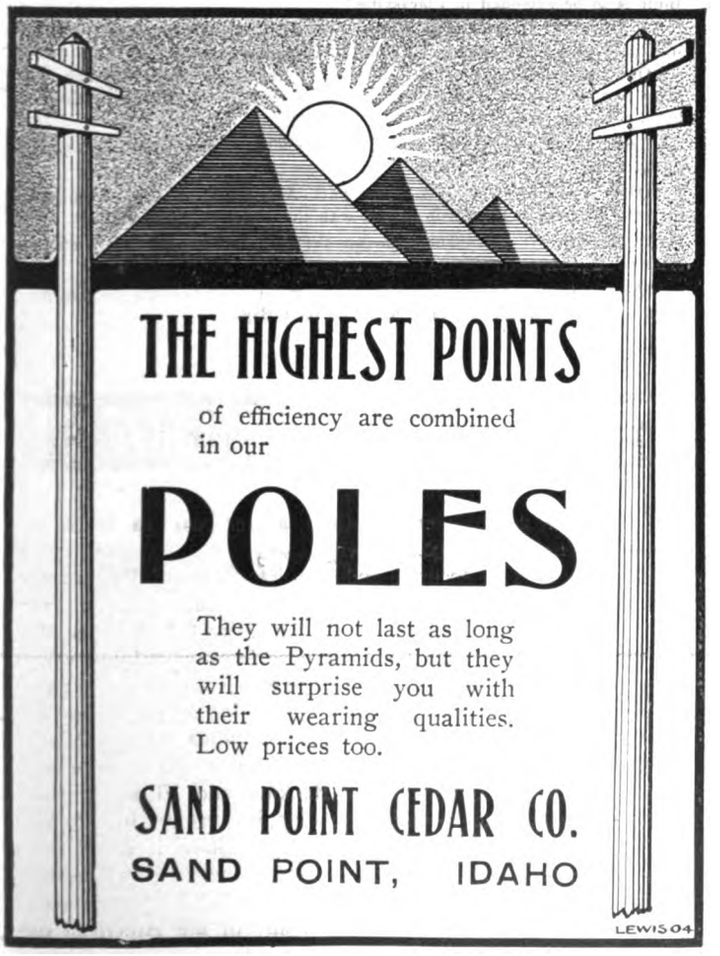
PITTSBURG & LAKE SUPERIOR IRON CO.,
ESCANABA, MICHIGAN.

PRODUCERS and WHOLESALERS

WE always carry a large stock of all sizes of White Cedar Poles, and having yards on all principal railroads in Northern Michigan and Minnesota, are in position to make immediate shipment.

"From the Stump to the Line."





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A Kansas Customer Writes— "We write to again thank you for your promptness in filling our order and for the good grade of poles sent; we will certainly advise you when next in the market."

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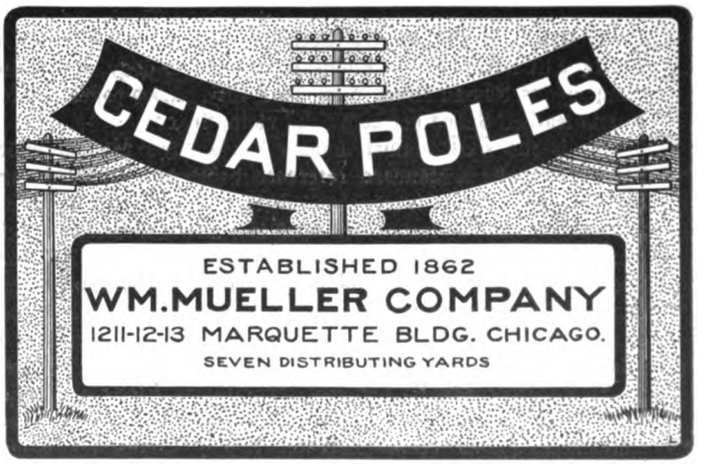

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HUDSON, WIS.—The Chicago & St. Paul Telephone Company has been formed with a capital stock of $100,000, by A. G. Zimmerman, Rufus B. Smith and A. T. Rogers, of Madison.

COMBINATION.

APPLETON, WIS.—The Fox River Valley Telephone Company of Appleton, and the Valley Telephone and Telegraph Company of Green Bay have consolidated.

PERSONAL.

E. M. AVERY has been elected secretary and general manager of the Burchard, Nebraska, Telephone Company, and R. A. Runyon, formerly with the Bell Company at Beatrice, will take the position of construction foreman.

CHAS S. DAVIS, for the past six years master electrician of the Bureau of Construction and Repair, Charlestown Navy Yard, has joined the engineering staff of the Holtzer-Cabot Electric Company, Boston, Mass.

JOHN A. DUNCAN, chief electrician of the Home Telephone Company, at Fort Wayne, Ind., has resigned his position to accept the superintendency of the Home Telephone Company's system at Sioux City, Ia.

G. G. GRIFFITH has been promoted to the position of division wire chief for the Rocky Mountan Bell Telephone Company at Nampa, Idaho.

ROBERT MACARTNEY has been appointed auditor of the Mutual Telephone Company at Saginaw, Mich.

E. M. O'BRIEN formerly local manager of the Iowa Telephone Company at Des Moines, has been made manager for the Mutual Telephone Company in that city.

A. VON SCHLAGEL will take charge of the contract department of the Northwestern Telephone Company at Minneapolis, Minn., and T. J. Seymour will succeed Mr. Von Schlagel as local manager.

E. E. THOMPSON, who has been manager of the Iowa Telephone in Boone, has been promoted to the Des Moines office.

M. H. TURNER has been appointed manager for the Central Union Telephone Company at Ashtabula, O.

J. P. WALSH has been appointed manager for the Northwestern Telephone Company at Fargo, N. D.

MISCELLANEOUS.

DETROIT, MICH.—The Co-operative Telephone Company, in pursuance of a provision of its franchise, has filed with the City Controller a deed conveying its property to the city in event of "any effort to dispose of this company's property to the Michigan Bell Telephone Company."

IRON MOUNTAIN, MICH.—The Independent telephone companies of the State have attained a considerable development, having 70,000 telephones in a territory where the Bell Company has but 39,000.

CHATHAM, N. Y.—The Columbia Telephone Company has reached Albany, and is now in a position to give service to that point as well as Kingston and Poughkeepsie.

CLARKESVILLE, TENN.—W. G. Nagel and associates, of Toledo, O., have sold out their interests in the exchange at this point to E. L. Barber. New lines are being built, and the plant will be brought up to a first-class standing immediately.

New Construction in the Field

BIRMINGHAM, ALA.—The Morgan County Telephone Company is constructing a long distance line from this city to Mobile, through Birmingham and Montgomery. The line is almost completed from Decatur to Cullman, a distance of thirty-three miles.

SAN FRANCISCO, CAL.—The New Home Telephone Company is to extend its lines to Palo Alto.

ST. JOHNS, N. B., CANADA.—The N. B. Telephone Company will at once erect an exchange building at Fredericton. The new structure will have a frontage of 22 feet by 55 feet deep. It will be of two stories and basement and will be of brick with fancy brick and redstone front. Plans for the building are now being prepared. The basement will be finished with asphalt, the first floor will be devoted to business and public offices, and the upper floor used entirely for operating.

ALACHUA, FLA.—The Alachua Telephone Company will soon commence the erection of the poles for a system for the town of Alachua, and will also handle a line to Gainesville and other points.

BLOOMINGTON, ILL.—The Independent Telephone Company is planning a two-story brick building to cost $10,000. Work will begin upon it this summer.

LAFAYETTE, IND.—The Lafayette Telephone Company is to spend $75,000 in improving its system.

NEVADA, IA.—The Mutual Telephone Company will erect a large building for the accommodation of its exchange.

QUINTON, I. T.—The Quinton Telephone Company is erecting poles and making all necessary plans to have its exchange in operation by Aug. 1.

COMSTOCK, MINN.—A new line is being built by the Neighbor State Company east of this place.

MINNEAPOLIS, MINN.—The Tri-State Telephone Company, which has direct connection between the Twin Cities and La Crosse, contemplates the extension of its lines throughout southern Minnesota. La Crosse and Albert Lea are to be the two terminals.

SAVANNAH, MO.—The Mutual Telephone Company, of Savannah, is to enlarge its exchange at that city and at Bolckow.

COTTON PLANT, MISS.—The independent telephone line from here to Bluff is to be extended to Clarysville.

ST. CLOUD, MINN.—The Haven and the Mahew Lake rural telephone lines are being completed and will be in operation shortly.

COOPERSBURG, PA.—The Consolidated Telephone and Telegraph Company is stringing wires and getting ready to install telephones in Coopersburg.

CLAYVILLE, VA.—The Clayville Telephone Company is to establish an exchange at West Alexander.

PORT ANGELES, WASH.—The Port Angeles Telephone Company is to establish long distance connection with the cities of Puget Sound.

CAMERON, W. VA.—The Cameron Telephone Company is to extend its lines to Moundsville.

MANITOWOC, WIS.—The Manitowoc & Western Telephone Company is to extend its line from Greenleaf to Green Bay.

Book Notices

MOODY'S MANUAL OF RAILROADS AND CORPORATION SECURITIES. Published by the Moody Publishing Company, 35 Nassau street, New York City. 2,600 pages. Price, Russia leather, $12.00 per copy; red cloth, $10.00.

This is the sixth annual number of Moody's Manual which has come to be a standard reference book with investors and business houses in this country. This year's edition comprises 2,600 pages, size 7x9 inches; the book is 4 inches thick and weighs over twelve pounds. It contains, its publishers claim, over 3,000,000 words and covers the entire field of corporation investments. There are ten sections to the volume and each section has been prepared by the company's experts. The increases in information over the 1904 edition claimed are about as follows: In Steam Railroads, 80 per cent increase; in Electric Traction Companies, 56 per cent; in Gas and Electric Light Company statements, 49 per cent; in Water Supply Companies, 80 per cent; in Telephone, Telegraph and Cable Companies, 32 per cent; in Industrials, 21 per cent; in Mines, 48 per cent; in Banks and Financial Institutions, 90 per cent.

The Manual is an accurate and complete Steam Railroad reference book. It is, the publishers claim, the only Electric Traction book that undertakes to cover the entire field in this comprehensive way; and the only reference book containing a section on Gas and Electric Light Companies of the country, a section on Water Supply Companies, a section on Telephone and Telegraph Companies, and a section on Industrial and Miscellaneous Corporations which is uniform and complete. The book contains complete statements of Banking and Financial Institutions showing the essential facts of interest to investors in Bank or Trust Company stocks. On the whole, it would seem that the volume should be the constant companion of the man who invests money or of one who is in search of information concerning the financial condition of any of the American corporate organizations.

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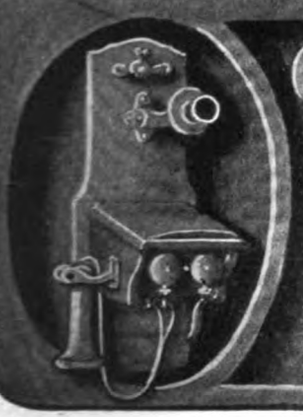
100% GOOD

The PLATINUM ELECTRODE TRANSMITTER originated, and manufactured only by us; will give you absolutely perfect service — on common or local battery systems.

PLATINUM, due to its peculiar qualities, is better adapted for electrodes than any other substance. It has an extremely low surface resistance, will not disintegrate, or cause packing or frying in the transmitter, and will give at all times a perfect reproduction of the original sound waves.

The PLATINUM ELECTRODE TRANSMITTERS are furnished on all CENTURY telephones — for local or common battery service.



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536 ELLICOTT SQUARE
BUFFALO, N.Y.

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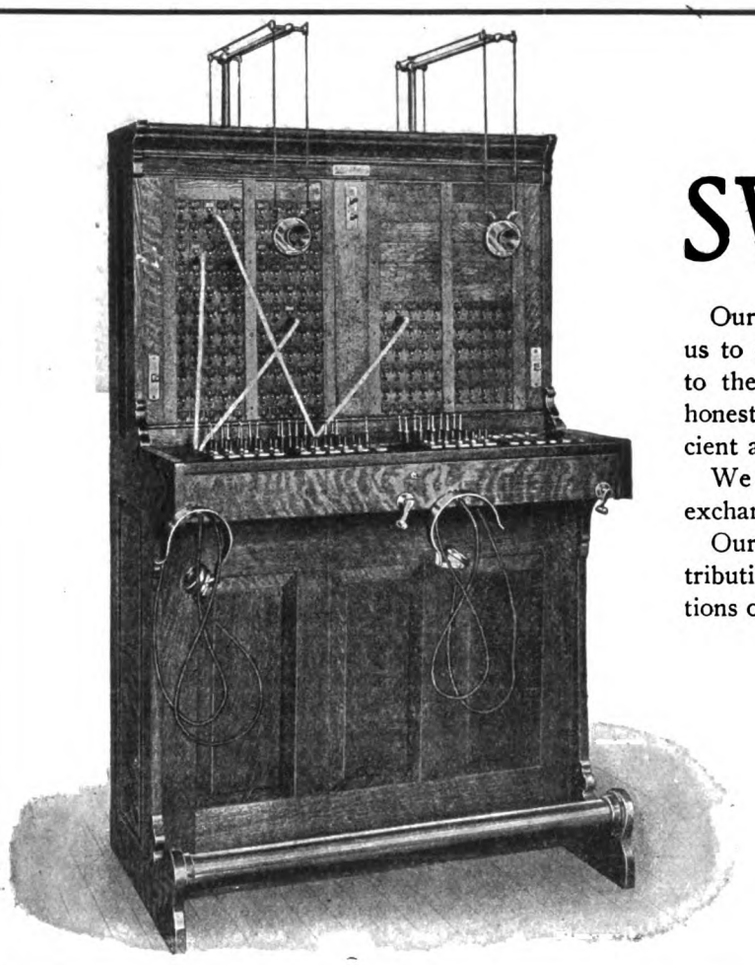

MONARCH SWITCHBOARDS

Our study of small exchange requirements has helped us to design magneto boards exceptionally well adapted to the service desired. Our well known methods of honest and careful construction make these boards efficient and substantial.

We are in a position to quote upon and build magneto exchanges of any size and solicit your inquiries.

Our new switchboard catalog is now ready for distribution and will be mailed upon request. The descriptions of MONARCH BOARDS will interest you.

MONARCH TELEPHONE MFG. COMPANY

10-16 So. Clinton St. Chicago, Ills

The Feature of the Telephone Convention

Among the cities in which our Automatic Telephone system has been adopted are:

Chicago, Ill.	Medford, Wis.
Grand Rapids, Mich.	St. Marys, O.
Columbus, O.	Woodstock, N. B.
Dayton, O.	Westerly, R. I.
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Auburn, N. Y.	Albuquerque, N. M.
Lewiston, Me.	Van Wert, O.
Auburn, Me.	Battle Creek, Mich.
Fall River, Mass.	Clayton, Mo.
New Bedford, Mass.	Pentwater, Mich.
Los Angeles. Cal.	Toronto J'ct'n, Can.
San Diego, Cal.	Wilmington, Del.
Hopkinsville Ky.	Riverside, Cal.
Sioux City, Ia.	Traverse City, Mich.
Cleburne, Tex.	Hastings, Neb.
Columbus, Ga.	Wausau, Wis.
South Bend, Ind.	El Paso, Tex.
Aberdeen, S. D.	*Havana, Cuba.
Miamisburg, O.	*Marianao, Cuba.

and Berlin, Germany.

*Sold June 22d, 15,000 line plant for Havana, 600 line plant for Marianao.

WAS OUR NEW AUTOMATIC FOUR-PARTY-LINE SYSTEM, with selective ringing and lockout.

Our exhibit of this new development of automatic telephony was the center of a group of interested telephone men during the entire term of the Convention.

It not only received their hearty endorsement, but it more than ever convinced them that we are always awake to the needs of the telephone industry and alert to supply them.

This new Automatic four-party-line system, with selective ringing and lockout, is ready for the market, in fact we are now filling orders for it. If you are interested, we shall be glad to send you particulars upon request.

Automatic Electric Company

Van Buren and Morgan Sts. CHICAGO, U.S.A.

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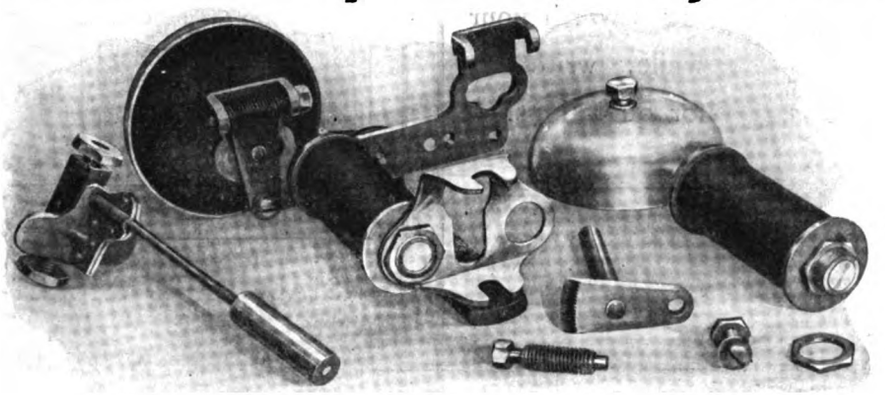
DEAN TELEPHONE APPARATUS

Dean Party Line System



DEAN HARMONIC RINGER PARTS. EXTREMELY SIMPLE AND RIGID CONSTRUCTION. NO MOVABLE CIRCUIT CONTACTS, PIVOT POINTS, OR BIASING SPRINGS TO GIVE TROUBLE.

No common battery installation is now considered complete without reliable party line service.

The new Dean harmonic non-interfering selective ringing system is the only equipment on the market to-day which fulfills the most exacting requirements of such service.

By its use four parties can be rung selectively on a metallic line circuit without the use of grounds or third wire connections. The absence of grounds eliminates untold troubles as well as excessive construction expenses. There is absolutely no interference or false tapping of bells. The ringers always respond when the proper ringing key is operated. Climatic and line circuit conditions have no more damaging effect than on the best standard type of bridging bell.

This system is a reality. Here is evidence:

Some cities in which our complete party line systems have been adopted:

Albany, New York,	Elyria, Ohio,	Potsdam, New York,
Amsterdam, New York,	Malone, New York,	Poughkeepsie, N. Y.,
Bangor, Pa.,	Medina, Ohio,	Racine, Wis.,
Cohoes, New York,	Niagara Falls, N. Y.,	Watervliet, N. Y.,
Dunkirk, New York,	Pittsburg, Pa.,	York, Pa.
	Plattsburg, N. Y.,	

A few of the exchanges in which our party line telephones and ringers are used on present frequency ringing systems:

Alliance, Ohio,	Cleveland, Ohio,	La Crosse, Wis.,
Anamosa, Iowa,		Norwalk, Ohio.

Let us figure on your new system.

THE DEAN ELECTRIC COMPANY
ELYRIA · OHIO

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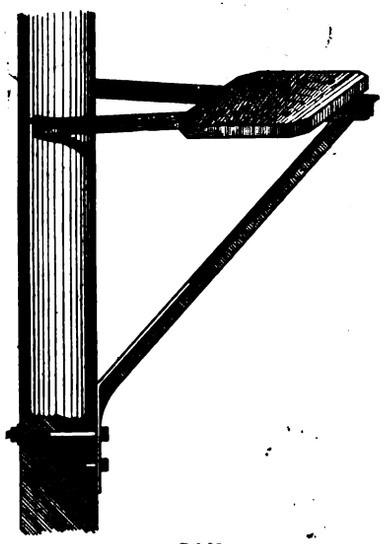
We can save you at least 10% on LINE CONSTRUCTION MATERIAL



no matter where you are buying now.

If such a saving is worth your while, write us for quotations.

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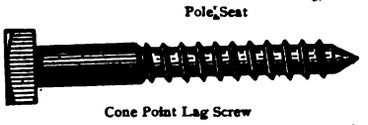
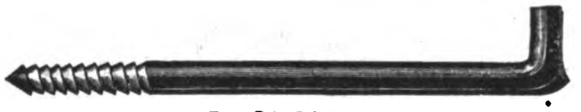


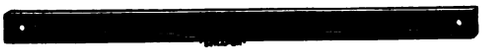
Cone Point Lag Screw

Gimlet Point Lag Screw



Fetter Drive Pole Step

Fetter Drive Screw



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Marlin Cable Hanger

Square Washer Through Bolt

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Electrical Exchange Building, New York City.

GET $2.00 PER MONTH ON YOUR PARTY-LINES with BAIRD Secret Service System

Central Office Calling Device

Some features of which are *Lock-out* and *Selective Ringing*. *Nineteen* or less on line. Gives fine *Toll Service* on party-lines.

Operator has control over all telephones. Central Office Calling Device controls many lines.

A Demonstrated Success

INSTALL BAIRD SECRET-SERVICE SYSTEM AND RAISE YOUR RENTAL RATES

OTHERS HAVE AND YOU CAN

SEND FOR DESCRIPTIVE BOOKLET

BAIRD MANUFACTURING COMPANY
MAKERS OF BAIRD PAY-STATIONS
6 MICHIGAN STREET, CHICAGO

No. 38.

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AUTOMATIC RESET INTERCOMMUNICATING TELEPHONES

WHY spend money for metallic circuit cable when *our system* is absolutely non-interfering and free from cross-talk, when using a common return.

If you have doubts, let us prove it to you.

The only Automatic apparatus equipped with rubbing, point contacts, hence is especially adapted for connection with the exchange.

If you want to see a sample, just send for one.

S. H. COUCH CO. INC.

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Strongest Pole Seat Made.

All Iron, adjustable to any Pole.

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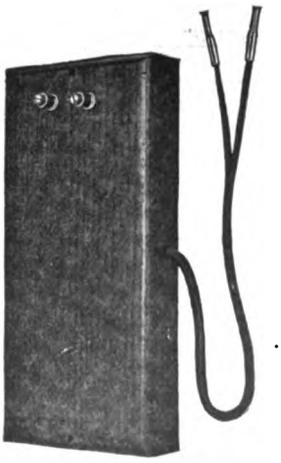
ANDRAE TELEPHONES NEVER DISAPPOINT

Every Andrae Telephone is built *right*. Every part of every Andrae Telephone is thoroughly tested before we allow it to be sold. That is why Andrae Telephones are always absolutely satisfactory—always efficient—always durable. We agree to "make good" every Andrae telephone that disappoints in any way, but we haven't found it necessary to "make good" one a month out of the thousands we are selling. IF YOU INTEND BUYING TELEPHONES YOU CANNOT AFFORD TO BUY ANY BUT ANDRAE TELEPHONES—THE BEST.

J. W. Milton writes: Easiest thing in the world to sell Andrae Telephones in this territory because in making a test of the 45 Giant Bridging 'Phones, three extension bells and bell on switchboard we rang the last bell as distinctly as the first one on twenty miles of line.



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Made in Several Styles. Write for Circulars.

The accompanying cut illustrates our new form of Condenser, fitted in a handsome quarter-sawed oak case, which is especially adapted for use in connection with telephones ALREADY IN OPERATION.
Its construction obviates the necessity of an expert's services for its *successful installation*.
We will furnish any telephone company with as many Condensers as are necessary to equip an entire line. If not exactly as represented they may be returned to us.

WRITE FOR OUR FREE BOOK No. 11

JULIUS ANDRAE & SONS COMPANY

No. 99 WEST WATER ST., MILWAUKEE, WISCONSIN

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The Time-Stamp Tells The Tale ~

"Promptness" Is Our Motto

JULY 1, 1905

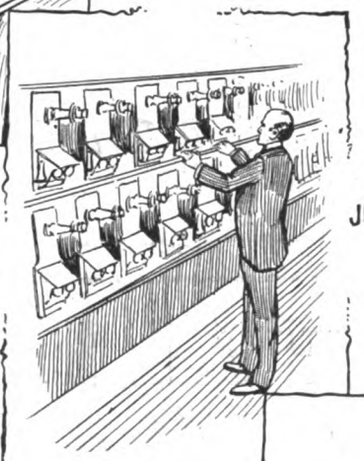
MAIL DEP'T.

~RECEIVING AN ORDER BY MAIL~

JULY 1, 1905

ORDER DEP'T.

~WRITING OUT THE SHOP ORDER~



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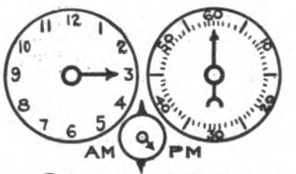

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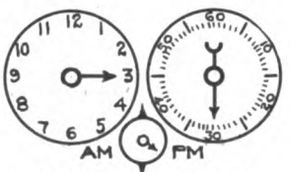

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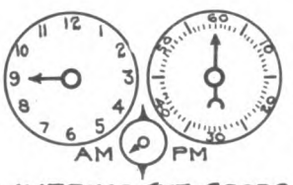

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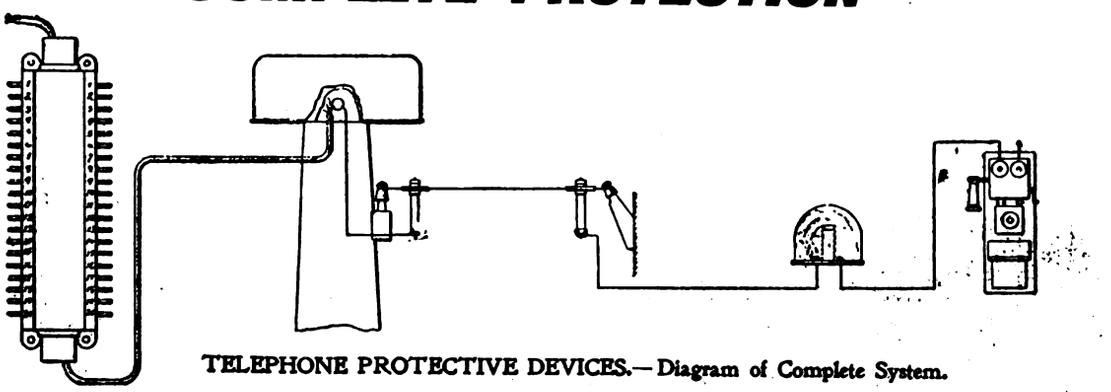

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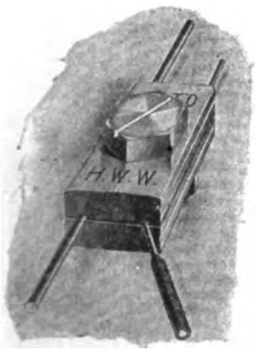

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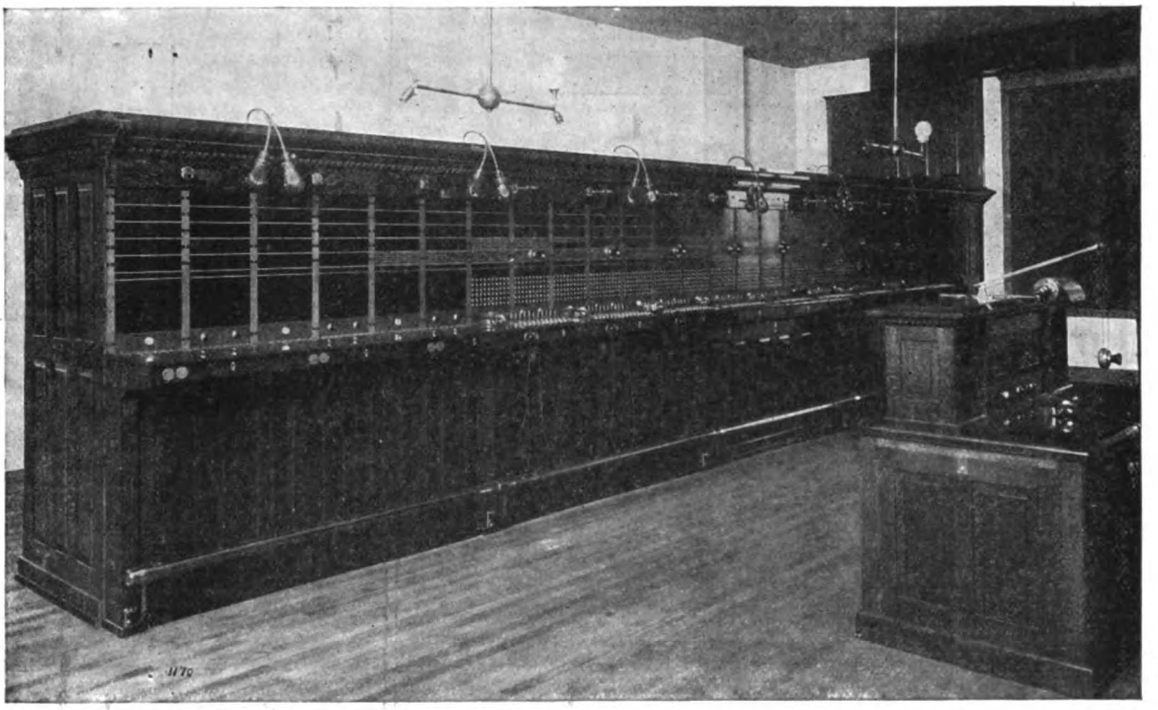

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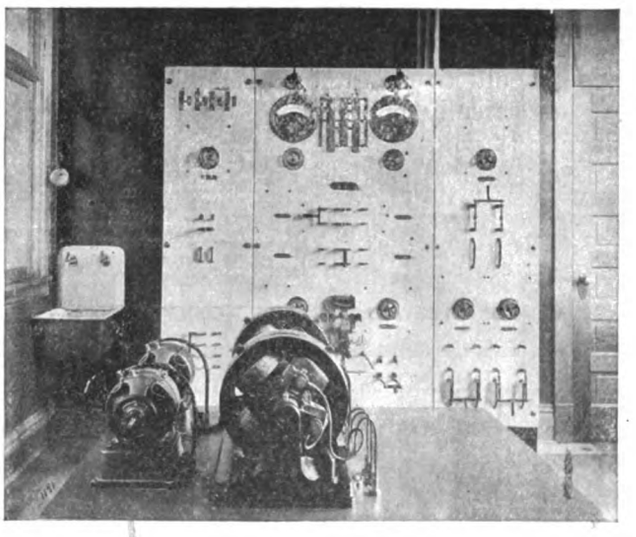

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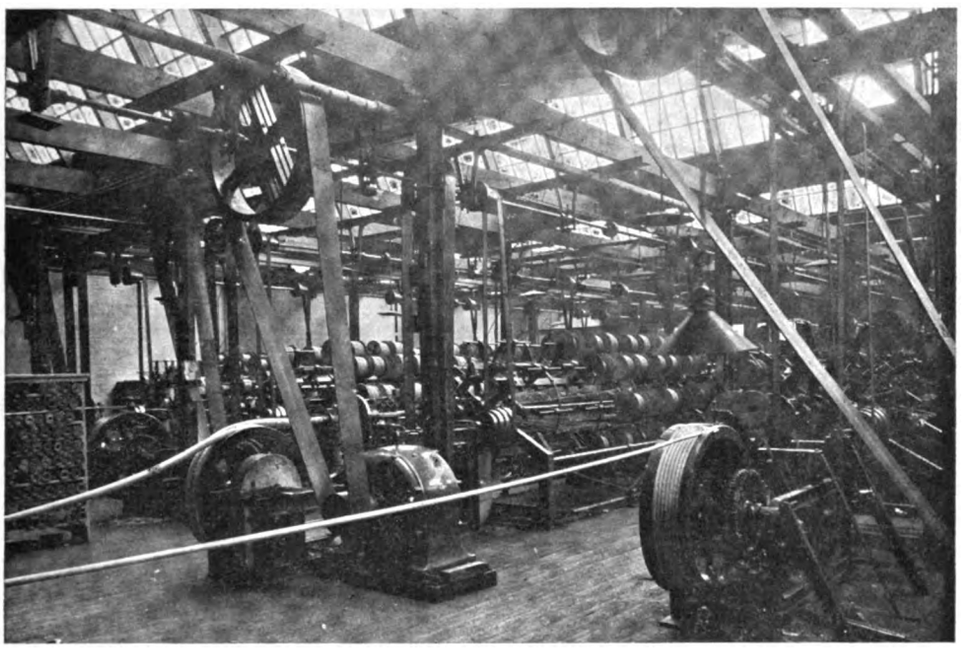

preceding it and so on through the several drums. Each drum contributes *one* layer of pairs and is revolved simultaneously with an alternate drum going in one direction, and an intermediate drum going in the opposite direction, thus forming a cable core consisting of concentric layers of pairs with adjacent layers put on in *reverse* direction. This constitutes a non-inductive core.

The electro-static capacity of the finished cable is directly dependent upon the diameter of the cable core. Therefore great care and skill must be exercised in forming or laying up this core. It is constantly under the rigid inspection of several operators during this process. This is greatly facilitated by the generous lighting of the numerous skylights.

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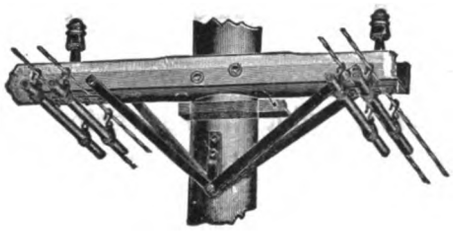
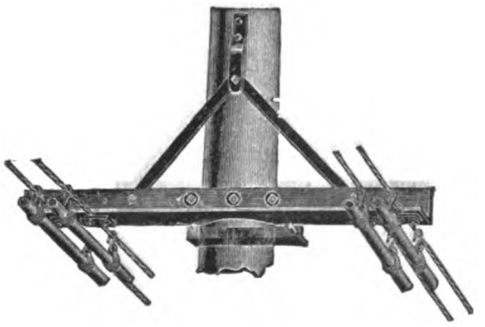


The best way to hang aerial cables. If space is valuable put the wooden arm in the iron arm. Saves room.



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3x3x¼x33 "	1	" "	4	"	"	26	"	1.55
3x3x¼x33 "	1	" "	6	"	"	26	"	1.75
3x3x¼x42 "	1	" "	6	"	"	30	"	1.90
3x3x¼x42 "	1	" "	8	"	"	30	"	2.10
	2	" "	add.....					.25

A discount of 5 per cent. on orders of fifty or more. May be assorted.

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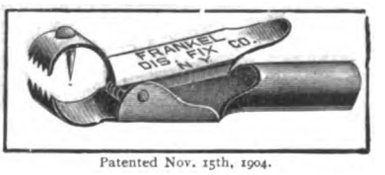

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Loading Telephone Lines for Long Distance Service

By Newton Harrison, E. E.

INTRODUCTORY.—Telephone lines present a complex problem in electrical engineering. They serve the purpose of transmitting speech, and in order to accomplish this become the recipient of electrical and magnetic energy. At one end of the line speech itself is received in the form of acoustic waves. A process then ensues, through which, part of the energy of speech is sent over the line in the form of electric waves. At the terminus of the line this electrical energy must again pass through a transformation from which it emerges as human speech. The problem is therefore primarily acoustic, in so far as the intention exists to transmit speech. It is electrical and magnetic in the method employed for the attainment of this object.

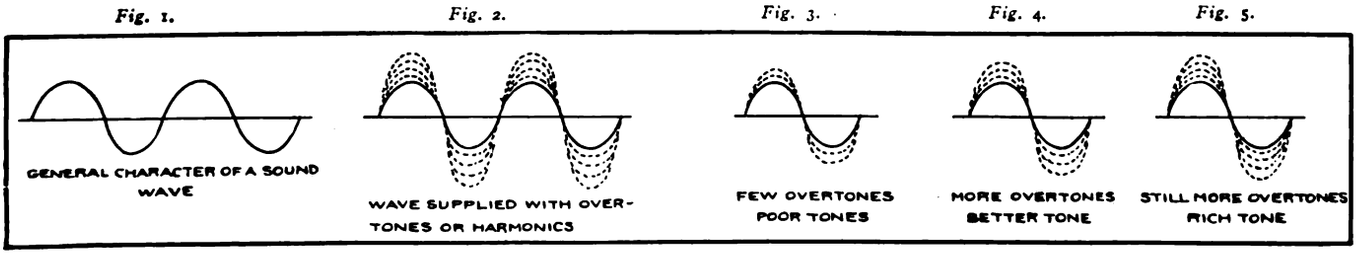
It has been observed that difficulties exist in the clear transmission of speech over long distances. Whatever they may be, it is evident that they must be found between the transmitting and the receiving end. They must belong to the distinct category of electrical and magnetic phenomena. A brief analysis of these conditions, in conjunction with those which constitute speech in its original form, will throw light upon the difficulties met in the transmission of speech over long lines.

Pro. Michael Idvorski Pupin. Inventor of the Pupin system of Long Distance telephone transmission.

Sound Waves of Speech.—Each voice is recognizable from another by those accustomed to its sound. Each voice possesses individuality, which renders it unique to friends and relatives. In what respect does this distinction occur? Why are all voices different? Why does the same note, when produced by a cornet, piano and violin, betray the character of the instrument producing it? What is richness of tone? What is a thin tone? It will be seen that all of these questions can be answered in the same general manner. The name *timbre* has been given to this quality of sound. The investigations of Helmholtz showed that when a musical note is heard, not only are a certain number of air vibrations per second reaching the ear (Fig. 1), but these fundamental air waves have associated with them what have been called *overtones* (Fig. 2). In other words, if the note C is heard from the piano, violin or cornet, although it is exactly the same number of vibrations per second from each instrument, the overtones or harmonics, as they are also called, unerringly point to the different sources of sound (Figs. 3, 4 and 5). The number of overtones and the character of them, produce the distinguishing difference. Timbre is thus due only to overtones and not to the necessary vibrations which constitute the note itself. And in this respect it is possible to understand the peculiarities of the human voice; why, in a sense, personality is associated with it; why the voice is the means of identifying the owner. The number of overtones are the distinguishing feature in connection with the volume of sound produced. A rich voice has magnitude (Fig. 6) and many harmonics. A thin voice, a piping treble, is without volume or sufficient overtones to make it pleasant. It is this which marks the difference between voices, and for that reason telephony cannot consistently succeed unless the preservation of such tones becomes one of its greatest objects.

Sound is transmitted in the form of consecutive waves. They may pass through the air until their original energy is dissipated, or they may be led through a conductor of sound to some point of reception. This physical fact is interesting inasmuch as it represents the first crude process transpiring in speech transmission. The second process is the transformation or, more correctly, the duplication of these sound waves in the transmitter of the system. From this point on the waves have become electrical. The overtones existing acoustically must, if characteristic speech is to be transmitted, be produced in the form of electric waves. It is here that one of the first great difficulties in telephony was met. Ordinary telephone apparatus is powerless to transmit and preserve the harmonics of speech (Fig. 7) over long telephone lines. A process of decay takes place. It has very aptly been called *attenuation.* The electrical overtones are destroyed and the fundamental tones obstructed in their passage. These conditions are the result of natural processes taking place

Fig. 1. *Fig. 2.* *Fig. 3.* *Fig. 4.* *Fig. 5.*



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in the line. They are the consequence of the inevitable presence of resistance, self-induction and capacity.

The Purpose of Loading a Line.—It now becomes evident that the purpose of loading a line, as the expression goes, must be to

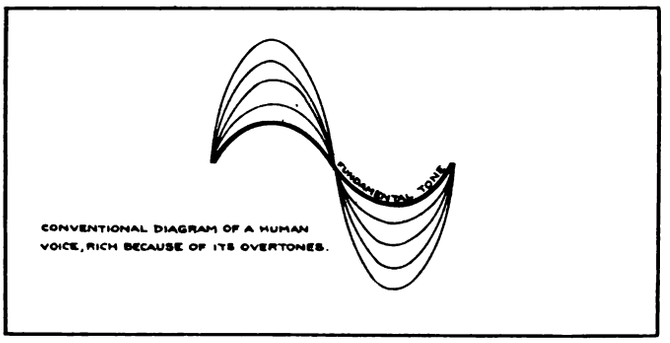

Fig. 6.

prevent the attenuating process from taking place where the resistance, self-induction and capacity do not express such a relationship that the electric waves are in part or wholly preserved. Thus the problem necessarily enters into a consideration of the influence of these elements upon the transmission of speech. On the one hand are acoustic vibrations with overtones, which vary with every human voice; on the other hand the telephonic apparatus and line whose electric conditions must be adjusted to preserve and transmit the resulting electrical waves. Mr. Oliver Heaviside advanced an important proposition in connection with this subject. He stated, as the result of his mathematical investigations, that high inductance was the only means of remedying defective articulation in long telephone lines. The presentation of this fact led to a clearer conception of the nature of the problem, but it remained for years without successful fulfilment.

Long Distance Transmission of Speech with High Inductance Lines.—Two reasons are given by Prof. Pupin for the construction of lines (Fig. 8) with inductance in them: First, small currents can be employed in the transmission of speech, which naturally means a limited waste of energy; second, where many electric waves with overtones are to be transmitted, the higher overtones are destroyed or attenuated, unless inductance is employed. The last reason given is really two, because not only is the speech preserved by the presence of a certain amount of inductance in its original form with many of the higher overtones, but the circuit, by such means, is rendered incapable of producing a distortion of the tones. The idea, therefore, is to produce a line in which, by the use of inductance, the resistance and capacity play a secondary part. It is particularly necessary to so adjust these relations that the capacity in a sense is rendered innocuous. In other words, the general idea is to free the line in an electrical sense from those influences (Figs. 9, 10, 11) which either attenuate, distort or destroy the familiar overtones. Mr. Heaviside solved only part of the problem. It was the subsequent analysis of Dr. Pupin and an exhaustive series of experiments which led to the ultimate practical result.

The Highest Important Wave.—Were it simply necessary to transmit a single impulse, the art of telephony would be advanced far beyond its present point. When the character of the waves to be transmitted vary from those of simple form of 200 per second to those of complex and rapid frequency of 1,500 and over per second, the necessity of settling upon a definite policy with regard to them becomes self-evident. Prof. William J. Hopkins presents the manner in which the various waves conflict and interfere with each other in the following didactic form:

First—The overtone waves of shorter period are reduced in amplitude to a greater extent than are the waves of longer period.

Second—The waves of different periods are displaced with regard to each other, those of shorter period being retarded to the greater extent.

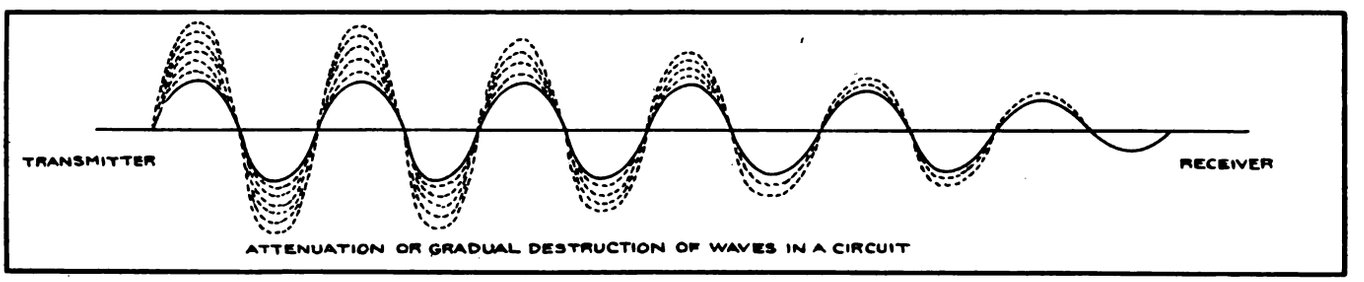

Fig. 7.

The second is the cause of the poorness of speech resulting over long lines. It is here that success was naturally sought for, and the difficulty of attaining it can be well understood when it is remembered that these complex waves each required theoretically a distinct set of conditions to pass them freely over the line. It was in a sense necessary to select the best overtones (Fig. 12) and preserve them. In fact, that is the practise of to-day as exemplified in the work of Pupin. The highest important overtone is preserved from attenuation. The line is supplied with a series of coils, each of given self-induction, placed at stated intervals to fulfil this mission in practical telephony.

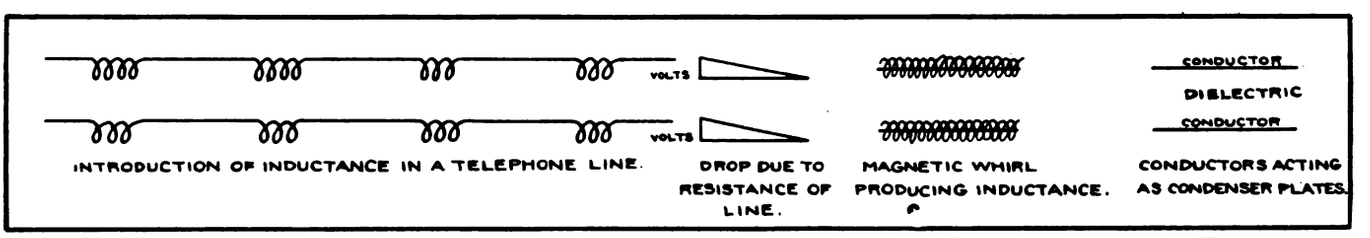

Fig. 8. *Fig. 9.* *Fig. 10.* *Fig. 11.*

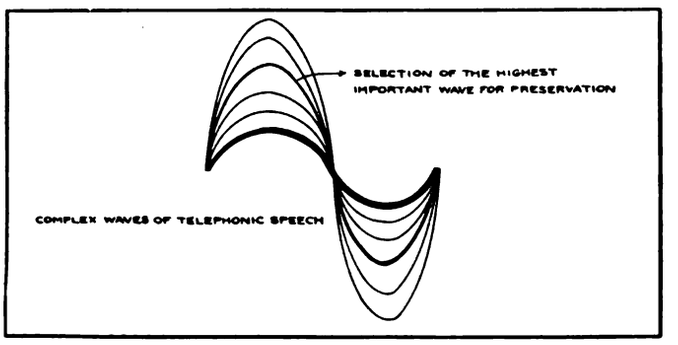

Fig. 12.

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Telephonic Maps

By Frederic D. Bond.

From the commencement of commercial telephone construction telephone companies have made use of maps of the districts in which they operated; but, in most instances, it has been the development of branch offices which has gradually necessitated, collections of elaborate street data and the design of charts, specially constructed to show quickly and easily the relations of each sub-station to the entire system. The oldest maps appear to have been usually plain street and property charts with sub-station numbers inserted at the proper places. Underground conduits, cables and party lines, being in those days un-

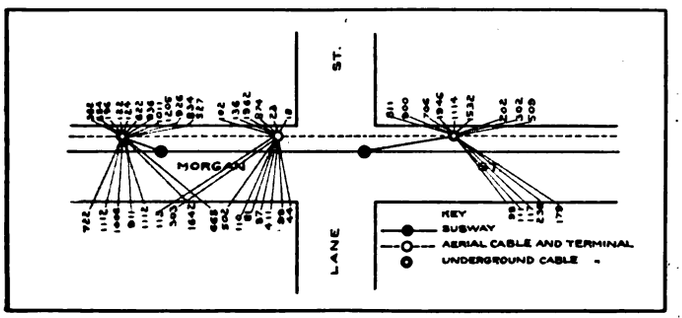

Fig. 1.

employed, no further mapping was needed, to give a good idea of the entire circuit. The street location of the wires might or might not be inserted, the absence of highway terminals making a graphic statement of this fact of much less importance than it would be at present.

As the science of telephone engineering developed, such maps as those mentioned were found to be inadequate, consequently the diagram-like chart known as the "spider" map has been evolved, which, with some differences of detail, is used either in whole or part, in probably every telephone exchange in America. In its most complete form, the spider map is based upon a diagram of the streets of the district to be mapped out, with their names and the street number of each building in the district. To make a spider map of such a diagram, the route of the cables is first inserted; if underground, frequently by a black ink line, if overhead, by a colored one. Terminals are then indicated by circles, the color of which indicates whether the cables are underground or aerial. Then the course of the aerial pole lines is marked, by means of a series of lines of another color. From each ter-

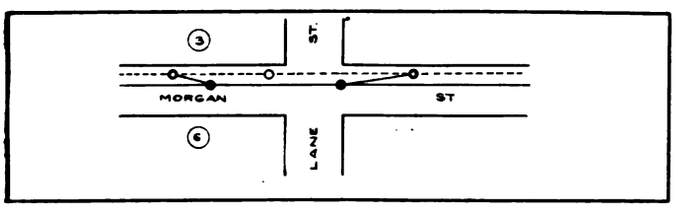

Fig. 2.

minal pencil lines are then drawn to the subscribers' sub-stations, to indicate the twisted pairs.

These maps are usually white prints made from a tracing. If the names of streets are wanting on such a print, much time and labor will be saved by supplying them either from a good street atlas, or, if none such has been published, from the city or county official records. The street numbers are next to be inserted. If the map is of a portion of a city, the best way to fill in the numbers correctly is to obtain the desired information from the Department of Highways, or the Tax Record Office of the locality. All this work should be done before the lines representing cables or wires are drawn. Construction gangs should not be allowed to run and lay wires at their own discretion, without full reports from the foreman being insisted upon, as it will otherwise be found difficult to make up a spider map correct in every detail. For the benefit of draughtsmen hampered by such a condition of affairs in their office, it will be found that the "trouble" men will usually be found the best persons to secure information from, respecting the exact locations of wires, and out-of-the-way localities. Naturally difficulties of this sort cannot well occur, save in the large companies, but when they do happen, it is usually a waste of time to look for the needed information in the engineering department, as the latter is dependent upon the constructing gangs for its own information

Coming now to the difficulties attending the making of spider maps even when correct in the details just noticed, it may be stated that it is in the drawing of the lines representing the subscribers' twisted pairs that the real trouble arises. As long as a map is of a district telephonically small, a spider map will be found to answer every requirement, and to afford the means for a rapid and accurate survey of the telephonic development. Lines running from the terminals to the sub-stations may be inserted in pencil, toll lines put in in blue or some other colored ink, and party lines indicated by starring or otherwise characterizing the pencil lines of the subscribers which are such.

When the line distribution is dense, a multitude of pencil lines are drawn from each circle representing a terminal to the nearby subscribers. Generally in the usual city maps, excluding the business sections, it will be found that from thirty to a hundred separate pencil lines are required to the square inch to indicate the twisted pairs. It is therefore almost impossible for the keen-

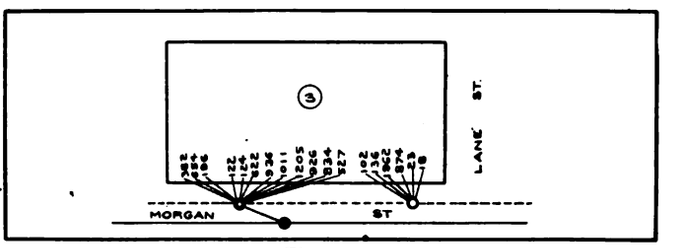

Fig. 3.

est eye to unravel the resulting maze. A typical example is shown in Fig. 1. One solution of this difficulty is to use maps of a smaller scale, but with this method of obviating the trouble as the telephone districts are not of uniform density in their different parts, as regards the number of subscribers, it frequently happens that, while one block of the city may be so jammed as to require a large sized portion of the map for its proper portrayal, another portion of equal size may have a bare half-dozen subscribers. Each time it is necessary therefore, to consult the positions of these sparsely settled localities, a large and cumbrous map must be brought out, if the scheme just indicated is adopted.

Another solution is herewith described: Suppose that a district contains several very thick groups of subscribers, by what is known as the "atlas" spider map, as much as each of these districts as can be conveniently placed on one chart is completely worked out. (See Fig. 2.) This process is repeated on a separate map for each portion of the district of suitable size. In this way a series of maps, every one of which may be on a different scale, is prepared, each chart being, however, of the same actual size in square inches. A map of the whole district with the complete cable, aerial wire and terminal systems, but no sub-stations is then drawn up. Finally, the entire collection is fastened together so that each chart may be readily detached to receive any additions. The cable map commences the collection and acts as a sort of index to each of the succeeding sectional maps. (See Fig. 3.) This method obviates the disadvantages inseparable from the ordinary style of spider map.

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Some Features of Private Branch Exchange Construction

By P. A. Price.

OFTEN it is desirable to so arrange equipment on private branch exchange switchboards, so that communication from private branch telephones to instruments on the city exchange will be impossible and yet so that local instruments may be readily communicated with. To accomplish this the following plan has been adopted:

Referring to Fig. 1, *A* represents a double row of jacks, the upper marked *T* for toll, the lower *L* for local. The lamp signals *S* are immediately below the jacks. In *B* is shown a single row, *L*, with their line signals, *S*.

The jacks in row *T* are slightly larger than those in row *L*.

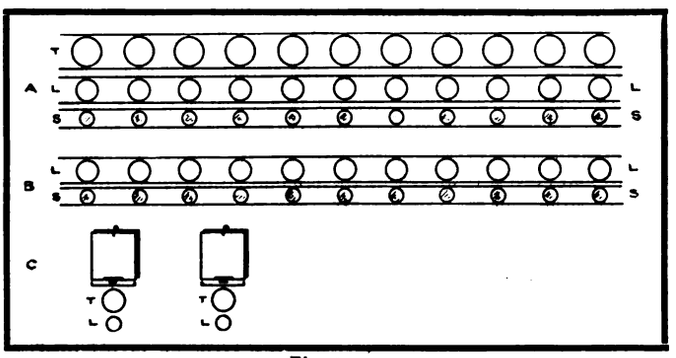

Fig. 1.

Row *L* in *A* and *B* are the same size. These *L* jacks are designed to accommodate the local cords of the switchboard, while the *T* jacks are for the transfer cords from toll to common battery. If an instrument is connected to a jack in *B* it is patent that no toll connection can be put up, as the transfer cords from toll to common battery are equipped with a plug too large for insertion in an *L* jack. In *A*, however, both sizes of jacks are provided, and either the ordinary local cords of the board or the transfer cords can be used. This arrangement is possible, whether the toll trunks are *"ringing"* or *"magneto,"* and if the incoming relay trunks terminate in a cord. If ring-down trunks, they will be terminated in a jack and an answering cord provided in connection with the common battery calling cord for the exchange subscribers. In *A*, row *T* and row *L*, are practically multiples of each, so their control of the cord signals are the same.

In *C* is shown a ring-down line from some exchange connection where the use of common battery is hardly feasible; for example, a party line connecting the different stations of the water supply, where the stations have frequent necessity of calling each other and must also have connection with the exchange and the various departments.

As this magneto station is on what might be called a toll line, a special pair of cords are frequently placed on the board to make toll-to-toll connection for long distance service from this station, if it is to be given unlimited service.

When this line is connected to a common battery station the ordinary transfer cords are used, as with a regular toll connection. In multipleing *T* and *L* of this line the leads from tip and sleeve of one jack are taken through condensers to the tip and sleeve of the other.

Instruments designed for purely local service need not be as elaborate as those used for long distance, inasmuch that no condenser or induction coil need be used. A simple series set of transmitter and receiver will suffice for the talking set, a low-wound receiver being used. Low resistance bells, ringing to ground from either tip or ring, may be utilized, depending on whether tip or ring of the battery is grounded. If this method is not favored, and condensers are not to be used, bells wound to 5,000 ohms may be used. With a 24-volt battery this high resistance may be bridged on the line and will not allow enough current to flow to operate the line relay and will not affect the voice currents appreciably. Such coils are expensive, however, and over-sensitive to injury.

Private branch exchanges are frequently installed in such odd corners that inspection and repair of the board is often a nuisance to operator and inspector alike. To afford a means of getting at the fuse panels, induction coil, etc., boards are frequently made in which these connections and wiring are placed on a panel inside the side of the board, which side is hinged and opens as a door. This gives ready access to those parts most liable to trouble. The punchings for the line terminals are also placed in this space and the door secured with a lock. This affords no opportunity to get at the relays, or cord rack, but makes a most convenient arrangement.

A novel feature in private branch boards is used by the Pittsburg and Allegheny Telephone Company, of Pittsburg, Pa., and is shown in Fig. 2. It consists in mounting the cord, trunks and line relays on a *"gate"* in the centre of the panel within the back of the board. This "gate" is hinged to the panel *P* and has a hollow centre. Screwed to the gate in horizontal rows are the relay strips, the armature ends exposed for adjustment. The relay coil terminals are on the inner side of the gate. In the illustration *C R* is the cord relay rack, *T R* the trunk and *L R* the subscriber line relay strips.

The switchboard cable form *C*, shown in dotted lines, is strapped to the panel at *S*, given a U-shaped bend at *B* and brought to where it fans out beneath the racks. The bend *B* is above the lower sill of the gate, so the latter may be opened to its full extent, giving access to the coil terminals. As shown, *a* and *b* are cables from the distributing frame, terminating in punchings. The fuse panel, ground and ringing current connections are shown to the left of the gate. The cable *C* runs on the

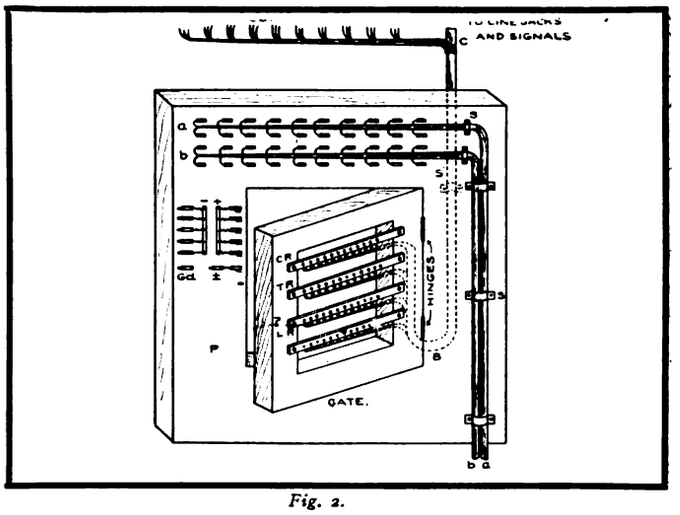

Fig. 2.

inner side of the panel and is concealed and protected from injury. The cable from the inner side of the punchings is not shown.

When no night service is given on a board and it is necessary that some of the stations be connected with the central telephone exchange, boards are frequently equipped with a button switch on each cord pair, which button cuts off the cord relays, etc. The station is plugged through to the central office over a trunk line, the button set and the station gets its battery from the central office direct and signals it in the usual manner by the receiver being taken from the hook.

In offices where no night service is given, provision is sometimes made for shutting off the battery from the board, to guard against a drain in case of damage to lines. A neat idea in this event is to place a double-throw button flush switch in the battery

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circuit between its main fuse and the distributing fuse panel on the board. The switch is placed under the cord shelf.

In larger private branches, where two sets of batteries are used instead of a battery wire from the central office, it is sometimes

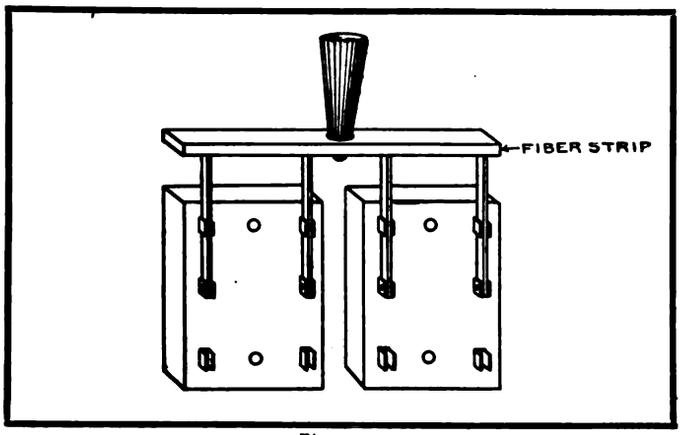

Fig. 3.

advisable to have a simple and positive method by which current may be supplied to the board from either set.

In Fig. 3 two double-pole two-way jackknife switches are mounted side by side and a strip of fibre or hard rubber used to make the act in unison. In Fig. 4 is shown the circuit diagram. When the switch is thrown in the direction of arrow *a*, battery No. 1 is feeding the board and battery No. 2 is being charged. On reversing the switch to direction of arrow *b*, battery No. 2 is feeding the board and battery No. 1 is in the charging circuit.

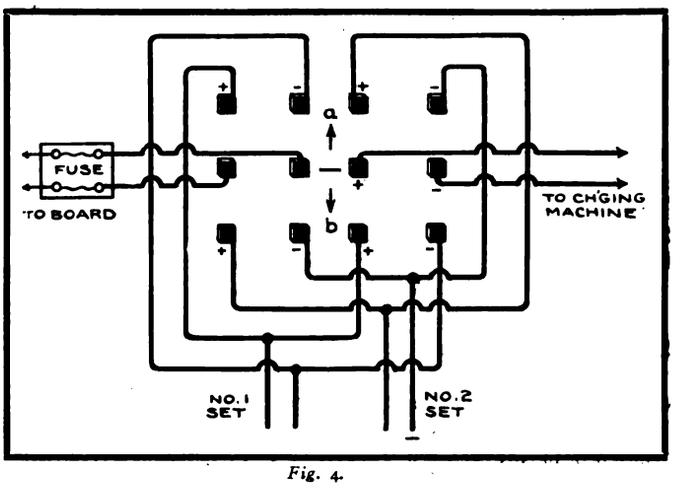

Fig. 4.

The operator can be instructed that if the lamps grow dim or signals are not working properly to *"throw the switch over."* While it is but an emergency assistance in this instance the arrangement can be utilized by a wire chief for regular work, using another switch in the charging circuit—if it is a power circuit—to cut off the charge lead when the battery is fully charged.

Telephone Conditions in the City of Mexico

THE service given by the "Bell" company in Mexico, and especially in the capital, has been so miserable for years that the public has given up complaining, having come to the conclusion that it is a useless task.

To illustrate this condition of affairs, and at the same time to show the state of indifference and apathy a whole business community can be thrown into by poor, inefficient telephone service, covering half a score of years, we translate the following article from the most prominent Spanish paper in Mexico City, *El Imparcial.* The quiet humor and satire are remarkable.

RULES FOR THE USE OF THE TELEPHONE IN CITY OF MEXICO.

"We herewith give our readers a few instructions for the use of the telephones used in the City of Mexico, which, posted up near the telephones, may help the subscriber to make better use of them.

"The first thing to consider is, that this instrument is not a telephone, but an apparatus of luxury, which we have in our office as an ornament. If you have any doubt about this, please try and use it, and you will soon be convinced. We pay for it because it gives an appearance.

"If the following rules are put in practice for half or three-quarters of an hour, and the subscriber has sufficient patience, it may happen that, after this lapse of time, a reply can be obtained from the party not wanted. But one need *not* get discouraged for a little thing like that; try again. (The subscriber approaches the telephone again, saying to himself some words which Jonas would have said in the abdomen of the whale, if he had had room for it, and calls for another fifteen minutes.)

"Never call for less than this time, and if the central has no time to answer, take a little trip to the nearest saloon for some refreshments, which will help you to recommence your work of obtaining an answer. Perseverance conquers everything, even the telephone, and thus you must insist on your return from the saloon. Generally the subscriber will find himself in a mood then to insist on obtaining an answer at any price.

"If the subscriber has at any time in his life taken pugilistic lessons, he will have a good opportunity to practice his knowledge in the art. When communication is obtained, and when you are really certain of having obtained it, you can talk either through the transmitter or the receiver. (It is quite indifferent), but you must yell at the top of your voice. If this does not lead to any result, then place your feet on the instrument, and say all sorts of naughty things.

"You must say lots of them; it does not surprise the operators any more; the man who uses a telephone in Mexico without swearing ought to be expulsed from the country as a subject dangerous to the peace of the community. A telephone and a mule are two things which can only be moved by using hard words.

"The management of the company respectfully advises the public that it is not responsible for the working of its instruments. The company complies with its obligations by placing it on the wall. If the instrument happens to work, that's the subscriber's gain.

"The company has a large assortment of instruments in stock, and therefore does not worry if a subscriber smashes this piece of furniture with a hatchet; the woodwork lends itself splendidly for this operation, being nice and soft. Try it if you like; a new instrument only costs $17.50, and the company never takes more than five years to replace it."

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IN THE OPERATING FIELD.

IMPORTANT MEETING OF INDIANA INDEPENDENTS HELD AT WINONA LAKE.

A SPECIAL meeting of the Indiana Independent telephone companies was held at Winona on July 12 to discuss ways and means for closer organization. The result of this meeting was the merging of the Indiana Mutual Telephone Association and the Southern Indiana Telephone Association into the Indiana Independent Telephone Association. The plan of formation is similar to the well-known Ohio scheme. About seventy-five delegates were present, including James B. Hoge, president of the National-Interstate Association; Theodore Thorward, president of the Indiana Mutual Telephone Association, and C. S. Norton, of the New Long Distance Company. A full report of the meeting will be published in our next issue.

EXTENSIVE IMPROVEMENTS TO BE MADE FOR THE LANCASTER, OHIO, TEL. CO.

T. R. PEARSON, superintendent of construction, and A. C. Morse, engineer of the Federal Telephone Co., are superintending the installation of an entire new equipment for the Lancaster, Ohio, Telephone Co. An entire new equipment will be installed in the exchange, the switchboard having a capacity of 2,000 lines.

Seventy-five thousand dollars will be expended for improvements in Lancaster and $15,000 will be spent on improving the county service. The Lancaster Company now has a waiting list of over 500 subscribers and it is expected that by September 1st these will be supplied. The cable lines will be brought into the building through an underground conduit in the rear of the exchange. The exchange will be greatly enlarged and the working force increased. With the new equipment the Lancaster Telephone Company will be in a position to furnish perfect city, county and long distance service.

CENTRAL UNION (BELL) MEETS REBUFF IN INDIANA.

THE Bell Company has encountered several difficulties in its monopolising campaign, following its purchase of the United Telephone Company of Indiana. It secured the Independent exchanges in Dunkirk and Red Key in Jay county, but those at Bryant and Salamonia refused to sell and are preparing to cover the county with a complete toll line of their own. From all present indications, it is certain that the Bell is also doomed to defeat at Kokomo, where it is endeavoring to get a modification of the franchise of the local Independent company, that will permit it to enter into an arrangement with the Bell company for long distance service. The city council is friendly to the Independent New Long Distance company. The Bell is making aggressive effort to get the Independents of Tippecanoe county. Offers have been made to the Romney and Odell exchanges. The object is to gain possession of a network of lines around the city of Lafayette, the county seat, so that it may force a sale of the Lafayette Telephone company. That the Bell is making preparations to install a multiple system, with less than 1,000 instruments in use, is deemed significant. The Lafayette company refused the Bell's offer to purchase its plant and made a counter proposition to buy the Bell. This was refused, and the Independent company then decided also to put in a multiple system. The Lafayette company is one of the strongest Independents in the state. It has 2,500 subscribers in the city and has a petition before the Board of Public Works for permission to lay underground wires in the downtown district. It has two through lines to Indianapolis, and it is announced two more will be strung at once.

A. L. TETU TO APPEAR BEFORE CANADIAN COMMISSION INVESTIGATING TELEPHONE SERVICE.

THE Select Committee of the House of Commons, of Canada, which is investigating the telephone situation in that country, has invited A. L. Tetu, former manager of the Home Telephone Company, at Louisville, Ky., who resigned to accept a similar position at Nashville, Tenn., to appear before that commission.

Sir William Mulock is chairman of the Select Committee. Mr. Tetu will meet several members of the committee in Chicago in a few days, from which city they will proceed to Ottawa, the Canadian capital.

NUMEROUS CHANGES CONTEMPLATED IN MANAGEMENT OF KEYSTONE CO. OF PHILADELPHIA.

IT is expected that the near future will witness several contemplated changes in the Keystone Telephone Company, of Philadelphia, Pa. A meeting of the directors was held recently and routine business was disposed of preparatory to the changes.

It is assured that Fisk & Robinson, the New York bankers, who financed the recent $10,000,000 bond issue, will be represented in the new board. The Foerderer interests in the company have been disposed of to a great extent and it is expected that James Collins Jones, who represents the estate in the board, will retire. Clarence L. Harper, president of the Union Trust Company, is mentioned as a probable new member of the board.

The election of N. T. Folwell as president of the company will be announced this week. He and Mr. Harper were very active in bringing about the changes in the company. The activity of such reform leaders in a company which has hitherto been looked upon as an Organization affair is creating no little comment on the street. John M. Mack will retain an active

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THE AMERICAN TELEPHONE JOURNAL is always in the market for crisp, snappy news or technical contributions. Descriptions of ways to do things telephonic, illustrated with sketches, and also descriptions accompanied by photographs are especially acceptable and will be paid for. Literary skill is not essential, but is, of course, appreciated. Send your sketch, photographs, and write the matter as well as you can. It will be dressed up, if necessary. Here is an opportunity for telephone men from engineers down to ground men to increase their incomes. An article cannot be too technical nor too elementary for us to consider. Articles illustrated with photographs are particularly desirable and will be substantially acknowledged.

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interest in the company, of which he was until recently president.

One of the chief measures that Mr. Folwell will devote his attention to after he becomes president, will be that of getting new business. With ready money at hand, it is the intention to branch out and reach every part of the city and surrounding country.

THE HUNTINGDON & CLEARFIELD (PA.) TELEPHONE COMPANY ISSUES BOOKLET DESCRIBING ITS DEVELOPMENT.

THE Huntingdon & Clearfield Telephone Company, operating in Clearfield and eight other towns in Cambria county, Pa., has issued a booklet dealing with its development and present financial standing. The company was organized two years ago by a number of the most influential men in that part of the State, and has to-day 265 miles of pole line, carrying 2,000 miles of wire, and operates nearly 1,800 telephones. The system extends from Snow Shoe in Center county to Patton in Cambria county, a distance of 105 miles. During the last year a net gain of 422 subscribers has been made, and this it is expected will be exceeded the present year.

FINANCIAL REPORT OF THE HUNTINGDON AND CLEARFIELD TELEPHONE COMPANY.

Gross rental receipts per annum on 1,780 telephones		$39,307.00
Gross toll receipts per annum based on May, 1905		9,962.88
Miscellaneous receipts based on May, 1905		2,155.60
Total gross receipts per annum based on May, 1905		$51,425.48
Five per cent. interest on $360,500 bond issue to date	$18,025.00	
General office and operating expenses	18,012.24	
		36,037.24
Net surplus per annum based on May, 1905		$15,388.24

TOLL STATEMENT.

Toll receipts quarter ending March 31, 1904	$160.35
Toll receipts quarter ending June 30, 1904	465.70
Toll receipts quarter ending Sept. 30, 1904	781.36
Toll receipts quarter ending Dec. 31, 1904	1,475.74
Toll receipts quarter ending March 31, 1905	2,044.70
Toll receipts for April and May, 1905	1,559.15

The company has recently purchased the Cambria County Telephone and Telegraph Company, and also the Indiana Telephone Company, which gives it complete control in the entire county of Indiana and the northern end of Cambria. These companies will increase the number of subscribers to the Huntingdon and Clearfield system about 1,200, and this number will be doubled within the next two years.

The officers of the company are E. L. Orvis, president, Bellefonte, Pa.; A. W. Lee, vice-president, Clearfield, Pa.; G. H. Lichtenthaler, secretary and treasurer, Philipsburg, Pa.; W. L. Malin, general superintendent, Clearfield, Pa.

MIDDLETOWN, N. Y., MAKES BINDING STIPULATION IN CONTRACT TO INDEPENDENT COMPANY.

THE stipulations laid down by the Middletown, N. Y., common council in the franchise granted to the Middletown Telephone Company consisted of twenty sections which covered twelve typewritten pages. The gist of these conditions is as follows.

All the work is to be done under the direction of the Common Council.

All damage by the company must be repaired at its expense and where streets are torn up they must be kept in order for one year following.

No poles or wires can be placed over paved streets, but a subway or conduit must be constructed.

The company is to construct conduits in all streets where paving is contemplated, having the conduit completed prior to paving.

Conduits must be placed in crossing paved streets.

The only poles to be allowed on paved streets are to be what are termed distributing poles.

Poles may be erected on streets not now paved but the Common Council will designate the streets to be used for that purpose.

The city reserves the right to determine the location of any and all poles; also to remove or change location. Poles also are to be painted repaired or altered at the order of the city and a list of same filed with the city clerk.

The company must surrender one-half the conduit to city, the latter to rent the remaining space to any companies using a current of low potential. One-half of this rental will go to the city—the other half to the Middletown Telephone Company.

If the company should cease to do business all subways are to become the property of the city.

The city is to have the use of the conduits for fire or police telegraph wires.

The company must furnish for the use of the city, telephones not to exceed 20 in number at the rate of $1 per month.

The company must remove all poles, and enter conduits in case all other companies are likewise ordered.

The company is to pay all expenses of getting the franchise and is liable for all damages.

A deposit of $1,000 must be placed in the Orange County Trust Company Bank to the credit of the City Treasurer and the franchise is not operative until the deposit is made.

PRELIMINARY MEETING OF THE IOWA CLEARING HOUSE ASSOCIATION HELD AT ROCKWELL.

THE meeting of the committee appointed to draw up the by-laws of the Iowa clearing house company that is to be formed for taking care of the toll accounts of the various Independent companies of Iowa, was held at Rockwell City recently, and resulted in the formation of an association with twenty companies on the list of membership.

There will be another meeting of the association in the near future, when practically all of the details of the organization will be completed. It is expected that several more companies will have entered their applications with the association for membership at that time. There are several hundred Independent companies in the state and it is expected that the greater part of these companies will be in the association before many weeks.

At the committee meeting at Rockwell City, circular letters were devised, which will be sent to all of the Independent companies of the state, explaining the benefits that are to be derived from the establishment of the clearing house. It is expected that this will result in bringing in a large number of the companies that have up to this time taken no part in the transaction.

So far, the location of the clearing house has not been decided upon, but it is probable that this matter will be settled at the next meeting.

PEOPLE OF NEW ORLEANS DISSATISFIED WITH CUMBERLAND SERVICE.

CONTINUED failure on the part of the Cumberland Telephone Company in New Orleans, La., to make good its promises of last spring, to the effect that its service would be improved, has resulted in renewed agitation among the business men of the city, to force a complete reorganization of the system, whereby this branch of the company operates.

General discontinuance of the party lines is alleged by the Cumberland Telephone Company, to be the only solution for the difficulties that beset the patrons. The patrons complain that the difficulties are just as evident on the direct as on the party lines. In consequence, the organized movement, begun by the Progressive Union, is soon to take steps to force the use of underground wires in the business district, and along the chief residence thoroughfares.

The railroad commission, which last spring made the company reduce its rates on the direct lines but permitted them to keep up the rates on the party lines, as a temporary measure, to force trial of the direct lines, will be again asked to intervene, and effect a greater reduction in rates unless the company, within a given time, does not improve the service.

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THE LOADING OF TELEPHONE LINES.

ACCIDENT and intention conspire at times to accelerate progress. Some departments of engineering are improved only by slow degrees, others make rapid headway and arrive at some very remarkable results. In either case, the influence of a trained intelligence must be considered, as in the end the prime mover. The study of acoustic waves by Helmholtz led ultimately to an analysis of their fundamental character, and thus threw some light upon the action transpiring, when they strike the telephone diaphragm. In fact, certain fortunate and now indispensable analogies have been drawn from the action of these waves, which have aided greatly in the interpretation of the more elusive current waves.

Strange as it may seem to the untrained mind, the actions and reactions apparently occurring in a line, due to the influence of a varying or alternating current, really occur around the wire. They represent an influence which clothes it with magnetism. Attention to the nature of these phenomena led to investigations which yielded rich returns. It may be stated that Heaviside first propounded the proposition that the diseases telephone lines suffer from when extending over long distances belong to the category of static inductive effects. In other words, the longer a telephone line, the greater this effect, until the message is actually absorbed. He suggested as a remedy for this difficulty, which seemed at the time insuperable, a distributed inductance. The idea of loading a line is therefore that of supplying the conductor with an influence which will neutralize the one acting injuriously.

The scientific side of the problem has been successfully solved, but the engineering phase of it will not be developed so quickly. By this, is not meant that only partial success may be met with, when telephone lines are loaded, but that where so great an innovation is introduced, skill and method must be developed. As a parallel instance, the Westinghouse air brake only became a success when an educational plan was adopted in connection with it. Other references could be made to illustrate this point, which is, in many respects, worthy of as much attention as the invention proper. But the most interesting feature of this method of developing the full transmitting powers of a telephone line, is found in the selection of certain overtones for preservation and the necessary disregard of some of the others. This proposition is forced upon the expert in this unique field of invention, by the physical conditions existing in the circuit, and the rate of change of the electric waves therein. The idea, therefore, which prevailed, above that of other theoretically possible solutions of this problem, was to choose a certain current wave and preserve it. Experience showing that others, of a lower frequency would be likewise preserved.

This, in total, seems to be the modus operandi; and the crystallization of this idea was the result of mathematical research as well as a long series of experiments. The coils referred to in this interesting article by Newton Harrison on Loading Telephone Lines for Long Distance Service, begun in this issue of the paper, are placed, as the writer states, at certain intervals. These intervals represent the extremities of current waves, the preservation of which, against what is called attenuation, being the object in view. The coils develop the inductance, which, in co-operation with the electro-static capacity of the circuit, perform the function expected of them, namely: the transmission of the average harmonic without alteration.

AN ENGINEERING PROBLEM SOLVED.

The influence of any device serving so great a purpose, necessarily gives rise to speculation regarding its ultimate applications. Inklings of transatlantic, as well as transcontinental possibilities, have reached the technical press throughout the country. There is at least this to be said, in relation to telephony along these lines: the difficulties have been unearthed and to a large extent swept away. The problem no longer belongs to the realm of the scientific. It may be classed as one worthy of the interest and efforts of practical engineers. This, it seems, is the correct attitude to take with regard to long distance overland or submarine telephony. Engineers may now look upon it as a legitimate field for their ingenuity and enterprise.

QUICK INSTALLATIONS AND THEIR BUSINESS VALUE.

IT is not necessary to moralize with respect to matters of essential importance. The necessity for doing them quickly and well is too much of a foregone conclusion. But a few words might be said with regard to the value of expediency in telephone work. A value which cannot be estimated only on the basis of what the company loses by dilatoriness, but which may be better defined in connection with the loss to the subscriber himself. The irritating delays which sometimes ensue after an order has been given to install a telephone, represent an object lesson which might well have for its theme, expediency and its business value. The question naturally arising is whether procrastination is the rule or whether it is the exception. To be just, it must be regarded as the latter; but the frequency with which instances arise, sometimes leads to an opposite conclusion. The installation of apparatus at the present stage in the development of the art of telephony, is a cut and dried proposition. The fact, as recently noted in our columns, that a Seattle newspaper had installed, between the hours of 8 a. m. and 11 p. m., a private exchange consisting of ten stations and four trunk lines, is an evidence of what can be actually done. The quality and quickness of an accomplishment has its reward; expediency in telephone work is the only thing. The public are full of encomiums for those that show it.

THE TELEPHONE IN THE SUBURBS.

THE great drygoods emporiums have pinned their faith to a good servant as far as their suburban business is concerned. And with equal emphasis, it might be stated, that the municipality as a whole, owes a debt of gratitude to those influences which co-operatively assist in the expansion of city limits. So vast a business, as is now transacted between the large centrally located city store and the consumer, owes much of its volume to the employment of the telephone as a rapid means of communication. But the telephone has exercised its effect in other directions as well. The suburbanite rapidly loses the sense of isolation, with respect to the more densely settled portion of the city. A telephone system is thus an effective means of producing civic cohesiveness. As a telling force in municipal development, it will be unquestionably admitted, that the telephone holds first place.

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The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

REFUSAL TO MARK POLES.

Our city ordinance requires all poles to be marked with the initial of the company owning them, and also lays down that for any failure to mark the poles as prescribed, a penalty shall be paid for each offence. Our company delayed in marking its poles and the Common Council is trying to recover in a separate suit for each pole. Can they do so or does one penalty cover the failure to mark all the poles? R. L. C.

IT was held in Pennsylvania that there can be but a single recovery for the refusal of a company to mark any of its poles. Lancaster vs. Edison Company, 8 Pa. Co., Ct. Rep. 178. 2 Am. Elec. Cas. 116.

REFUSAL TO PAY RENT FOR SUBWAYS.

What remedy has a subway company against an electric company occupying its subway with wires, when the latter refuses to pay rent? S.P.

THE Subway Company under such circumstances is entitled to possession of the space occupied by the Electric Company. The Subway Company is not limited to an ordinary action for the recovery of money, but may, after reasonable notice to the Electric Company to remove its wires, and on non-compliance with such notice, cut and remove such wires itself. Brush Electrical Illuminating Co., vs. Consolidated Subway Company, 15 N. Y. S. 477.

RIGHT TO LIMIT SERVICES UNDER IMPLIED CONTRACT.

AT Johnstown, Pa., Thos. J. Itell has filed a petition praying for a writ of alternative mandamus directed to the Johnstown Telephone Company. In his petition he avers that, as a subscriber for telephone services at his law office and residence, he had paid all rent, tolls and charges, legally due the company, but that on Dec. 1, 1903, the company began to charge tolls for telephonic communication from Johnstown with Ebensburg, Cresson and other places, and refused to give connection to permit him to use its lines to those places until the tolls demanded were paid. Mr. Itell takes the position that by paying in advance, he became entitled to talk to these places in return for his regular rental. He charges that the company did not reduce its rates when free service with the places mentioned was cut off, and that it refused to state the quantity or extent of the telephone service to be rendered, holding in effect that the company could at will determine the extent of the services to be rendered during a quarter already paid for. The company took out Mr. Itell's business and residence telephones and the mandamus he asks is for the purpose of having them re-installed.

SELLING RIGHTS TO OPERATE TELEPHONES.

THE city of California, Missouri, sued the Buncton Telephone Co. for five per cent of its gross receipts. Judgment was given for the city in the trial court and an appeal was taken to the Supreme Court of the State. The city had authority to sell and dispose of franchises used within its limits and passed an ordinance authorizing the sale of the privilege of constructing and operating a telephone plant and business in the city. The Supreme Court held that the ordinance, the purchase by the defendant for the agreed per cent of the gross receipts, and the acceptance of the same by the defendant, by giving the bond which was filed under the provisions of the ordinance, constituted a valid contract under the statute. One of the objections of the telephone company was, that other companies had been given the privilege of using the streets for telephone purposes without charge. To this the court answered, that there was no attempt or agreement to give the defendant an exclusive right to the operation of a telephone exchange and it therefore did not see how it could make any difference to the defendant that other companies were allowed to operate without charge. City of California v. Buncton Telephone Co., 87 S. W. 604.

INSULATION AND PROTECTION OF WIRES.

A TELEPHONE lineman met his death under the following circumstances. A telephone wire, which he was raising, came in contact with an electric light wire underneath it and the current passing through his body, caused him to fall to the sidewalk beneath, causing his death soon afterward. The city ordinance required that all conductors and wires should be properly insulated and all overhead conductors should be protected by guard wires or other suitable mechanical device or devices. The negligence was the failure to maintain guard wires and the permitting of its wire to become uninsulated. The insulation had been a sort of rubber covering and was described as having been in a rough, frayed condition, so that little strips were hanging from it. The court held that the defendant was negligent. The company contended that the ordinance was rendered indefinite by the use of the phrase, "Or other suitable mechanical device or devices." The court held that the ordinance was not thereby rendered indefinite nor that the phrase improperly delegated power to a city representative to determine what are suitable mechanical devices. Part of the defense was that the plaintiff was negligent himself in failing to use a belt or gloves, but this question the court held was properly left to the jury. Commonwealth Electrical Co. vs. Rose, 214 Ill. 545, 73 N. E. 780.

DUTY OF ELECTRICAL COMPANY TO THOSE WITH WHOM IT IS IN CONTRACT.

IN a suit by Harry Rosenstein against the Fairhaven & Westville Railroad Company for injuries from leakage of electricity from the defendant's electric wires into a street where plaintiff was driving, the defendant attempted to interpose the defence, that there were no contractual relations between the parties and that the company was not an insurer of the plaintiff's safety. The court overruled this defence, although it reversed a judgment for the plaintiff. Rosenstein vs. Fairhaven & W. R. Co., 60 A 1061.

FOREIGN CORPORATION COULD NOT BUILD LINE.

AT Winchester, Va., Judge Thos. W. Harrison has decided an important case in the Circuit Court growing out of an injunction restraining the United Telephone Company from erecting a telephone line on the Winchester and Martinsburg turnpike. The court decided that as the company was a foreign corporation, not paying taxes as required by the State and not having a charter from the State Corporation Commission, it had no legal standing and no right to conduct a telephone business.

PERMIT FROM ONE NOT AN OWNER.

IN an action for damages to land by the erection of telegraph poles where defendant had a permit from one not at the time the owner of the property, a decree finding that such permit was no defence, as there was no reason why defendant could not have ascertained to whom the land belonged, was proper. So the Supreme Court of South Carolina held in the case of Duke vs. Postal Telegraph Cable Company, 50 S. E., 675.

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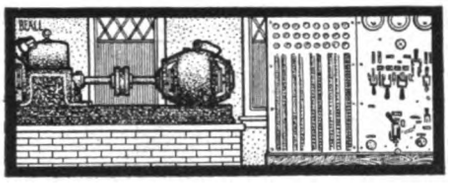
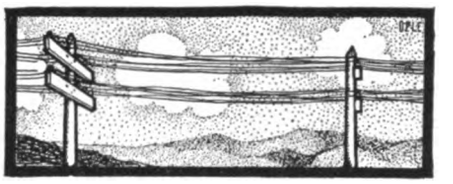


QUERIES

Questions on any subject relating to telephony will be answered on this page.



HARMONIC BELL ADJUSTMENT.—(580.)

In a Dean selective ringing system, how are the adjustments of the bell hammer weights made so as to compensate for differences in temperature?
M. Z. A.

IT is not necessary to compensate for temperature variations as in practice they have no appreciable effect on the operation of the ringer. Fig. 580 shows an armature of the new Dean selective ringer. On of these taken at random showed a length *A* of 4,492 inches at freezing temperature, while at 600 degrees Fahrenheit this length was 4,512 inches, an increase of only 20-thousandths of an inch. In practice the variation from the most extreme cold weather to the hottest weather would mean a variation much less than 3½ thousandths. This variation has not the slightest effect, neither does the temperature change effect the action of the mounting spring. In harmonic ringers of the Dean construction the weight practically determines the tuning of the bell to the desired frequency, the "factor of safety" being, of course, taken great so as to prevent interference.

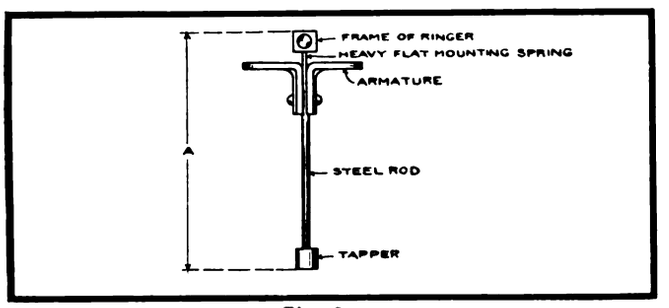


Fig. 580.

RING GROUND AND TALK METALLIC AGAIN.—(581.)

In your circuit 549A in the issue of May 13th, I noticed when a party rings the exchange grounded there would be a leak through bells at the station, making that bell in series with two bells on the line. The drop at the exchange should be wound to 500 ohms, but that would not prevent the bells at all stations from tinkling. If I am not right please let me know. I have sent a rough drawing, Fig. 581A, which I think will work all right on open generators.
M. J. V.

In circuit 549A there will be a path through the bell of the instrument used in ringing the exchange so that under some conditions other bells will be rung on the line when the button is pressed. However, this does not effect the operation of the circuit provided the receiver is off the hook, for then the path through the bell is broken. In every case it is necessary to remove the receiver to listen on the line to find if it is in use before ringing. Of course, this would mean that when ringing other parties on the line, the receiver would have to be replaced on the hook, while for calling central there would be no need of going to this trouble. The circuit in question was devised by a large operating company and introduced into an extensive territory, thus becoming known as a "standard" telephone circuit. The circuit shown in Fig. 581B is a modification of that shown in Fig. 549B, and as it eliminates the necessity of remembering to keep the receiver off when doing one operation and replacing the same for another operation it should be considered more of a standard than the latter. Your circuit, Fig. 581A, will give the same results as Fig. 581B, but has the objection of open circuit generators, which are liable to burn out through high tension discharges. When possible all telephone generator armature windings should be normally short circuited so as not to take chances from this source.

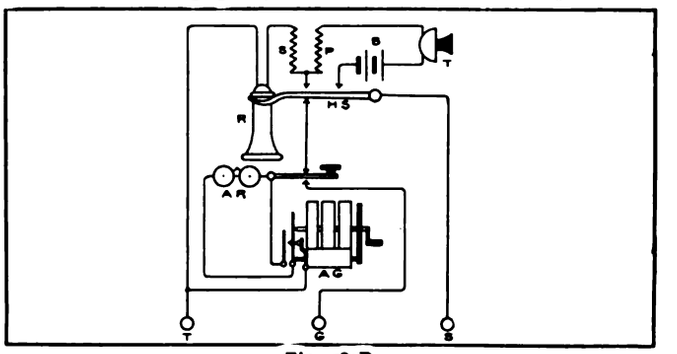


Fig. 581B.

POLE CHANGER AND RINGER QUERIES—(582.)

(1) Would it be practical to use the current from a 110 volt direct current incandescent circuit with a Warner pole changer for ringing purposes?

(2) What would be the requisite number of amperes for a two-party bridging line, with 1,000 O. ringer coils, the coils short type?

(3) Would this source of power be more expensive than 60 dry cells where the rate is 7 cents per kilowatt hour?
M. W. P.

(1) Yes, provided the 110-volt direct current circuit was not grounded so as to interfere with any grounds that might exist in your ringing circuit. The placing of two or more 16 c. p., 110-volt lamps in multiple on both sides of the direct current circuit, before connecting to the pole changer will serve as ample protection, as any short circuit will then only take what current the lamps require to light them.

(2) The current used in operating a 1,000-ohm ringer depends on the total resistance of the circuit, the impedence of the ringer and upon the voltage and frequency of the ringing and upon the voltage and frequency of the ringing current. Under average conditions this current might be taken as 1-10 ampere for a 1,000-ohm ringer.

(3) Lack of necessary information in your question will not allow a definite answer, but with average conditions it would be less expensive to operate your pole changer from the 110-volt D. C. circuit at 7 cents per kilowatt-hour than from 60 dry cells.

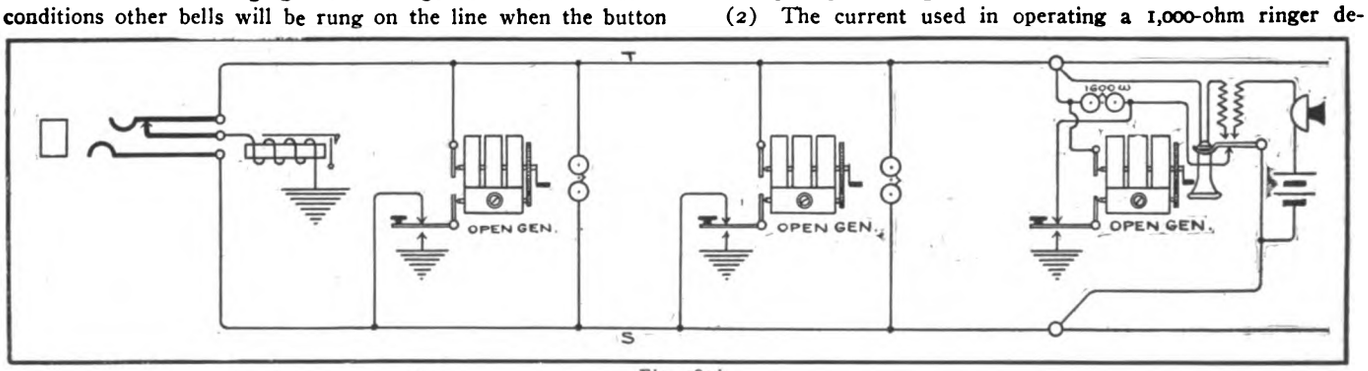


Fig. 581A.

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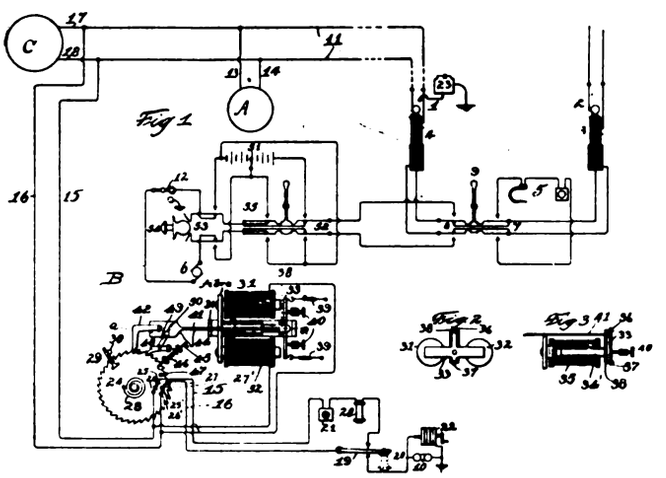
TELEPHONE PATENTS

SELECTIVE SIGNALING.

Edward A. Beull, DeKalb, Ill., patents (No. 792,691, dated June 20, 1905, filed May 9, 1904, and assigns to the Selective Signal and Telephone Manufacturing Co.) an improved system of selective signaling. The principle feature of this invention is the employment of an electro-magnet at the substation which operates a circuit changing device, to cut in or out both sides of the line to the telephone instrument. For this purpose the inventor provides a toothed wheel 24, which has two sets of pins 25, 26, 25^1, 26^1 mounted upon its surface. These pins are insulated from the frame work and from each other and constitute branch terminals



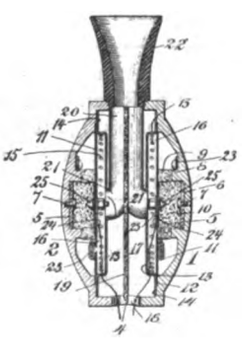
of the lines 15, 16. The relation between the pins 25, 26 and 25^1, 26^1 depends upon the stations, as in the case of station *A* they might be separated one tooth, at *C* three teeth, or at *B*, two teeth. Pins 25, 25^1 constitute the normal contacts for the springs 27, 27^1, which are connected to the telephone instrument. The wheel 24 is provided with a retractile spring 28 which holds it normally in position, by means of the projector 29 bearing against the stop 30. A branch of the circuit 15, 16 is connected to the coils 31, 32 of the electro-magnet, in such a way that opposite poles will be produced when current is flowing. The magnets are connected together with a fibre yoke, and are provided with a polarizing magnet 34. The armature is pivotially mounted upon a bearing 38, which is supplied with a shaft 34^1 sliding in a tube 35. Tension springs 39 maintain it in its normal position. To the armature is attached a rod 41 which carries a pawl 42 and a dog 48, also an ear 44 to engage the plunger 45. At the exchange besides the regular cord equipment, there is a battery 51 divided into two parts and auxiliary keys, 52, 53, 55 and switch 12. The operation of the system is as follows: To call a party, the calling plug 4 is inserted in the jack of the line desired and the key 52 moved to close its contacts to circuit of key 9. Key 9 is then oscillated to open and close springs 8, which movement causes the current from the whole of the battery 51 to intermittently flow through the coils 31, 32. This current is powerful enough to bodily move the armature 31 towards the pole pieces, causing the pawl 42 to engage the teeth of the wheel 24, and move it forward one tooth at a time corresponding to the oscillation of the key 9. When the wheel has been moved forward the desired number of teeth the key 53 is pressed, when the left half of the battery 51 is sent over the line and causes the armature 33 to rock in its bearings counter clockwise. This movement causes the ear 44 to force the plunger 45 downwards till its hooked end engages pin 47, when the wheel is locked in position. The pins 26, 26^1 of the desired station will then be in contact with the springs 27, 27^1 and a circuit established to that telephone. The pins of the other stations not being in contact their telephones are cut out. To restore the instruments to their normal condition the locking key 53 is released and key 55 operated when current from the left hand half of the battery will be sent over the line in the reversed direction, causing the armature 33 to move clockwise, lifting the pawl 42, and allowing the wheel 28 to return to its normal position. The purpose of the switch 12 is to ground one side of the line for ringing purposes.

TELEGRAPHONE.

Valdemar Poulsen, Peder O. Pedersen and Carl Schon, Copenhagen, Denmark, patents (No. 789,336, dated May 9, 1905, filed September 2, 1902) an improved form of telegraphone. In this invention the patentees disclose improved methods of recording sounds over those claimed in patent No. 661,619, issued to V. Poulsen, November 13, 1900. The specification calls for the employment of a loose wire which is coiled upon two spools in such a way that when being coiled on one it is uncoiled from the other. The recording and reproducing magnet is placed between the two spools, and the spools are revolved by electric motors. By this construction the inventors claim to effect economy in space and also to simplify the mechanical working of the device.

TELEPHONE TRANSMITTER.

De Elbert A. Reynolds, New York, N.Y., patents (No. 792,927, dated June 20, 1905, filed February 25, 1905) an improved form of double diaphragm transmitter. In this invention a casing composed of two cup-shaped members *1 2* is employed which is held together by screws. In each cup a recess *5* is made at the base of which is a carbon disk *6*, which form the rear electrode. A retaining wall of felt *9* is employed to hold the carbon granules in position between the rear electrode *6* and front electrode *24*. The front electrode is attached to a diaphragm of some non-



conducting material *11*. Over the diaphragm is placed a cup *13* which has a number of orifices *15* to serve as air vents, through which the sound waves can be dissipated into the central chamber *17*, which is open to the atmosphere at *18*. A sound receiving and transmitting tube *20* is employed having two laterally extending branches *21*, which conduct the sound waves to the transmitting diaphragms *11*. The inventor claims by this construction to be able to use either transmitting unit separately with individual batteries, or to use the two in multiple and thus secure increased distinctness in transmission with a greater volume of sound.

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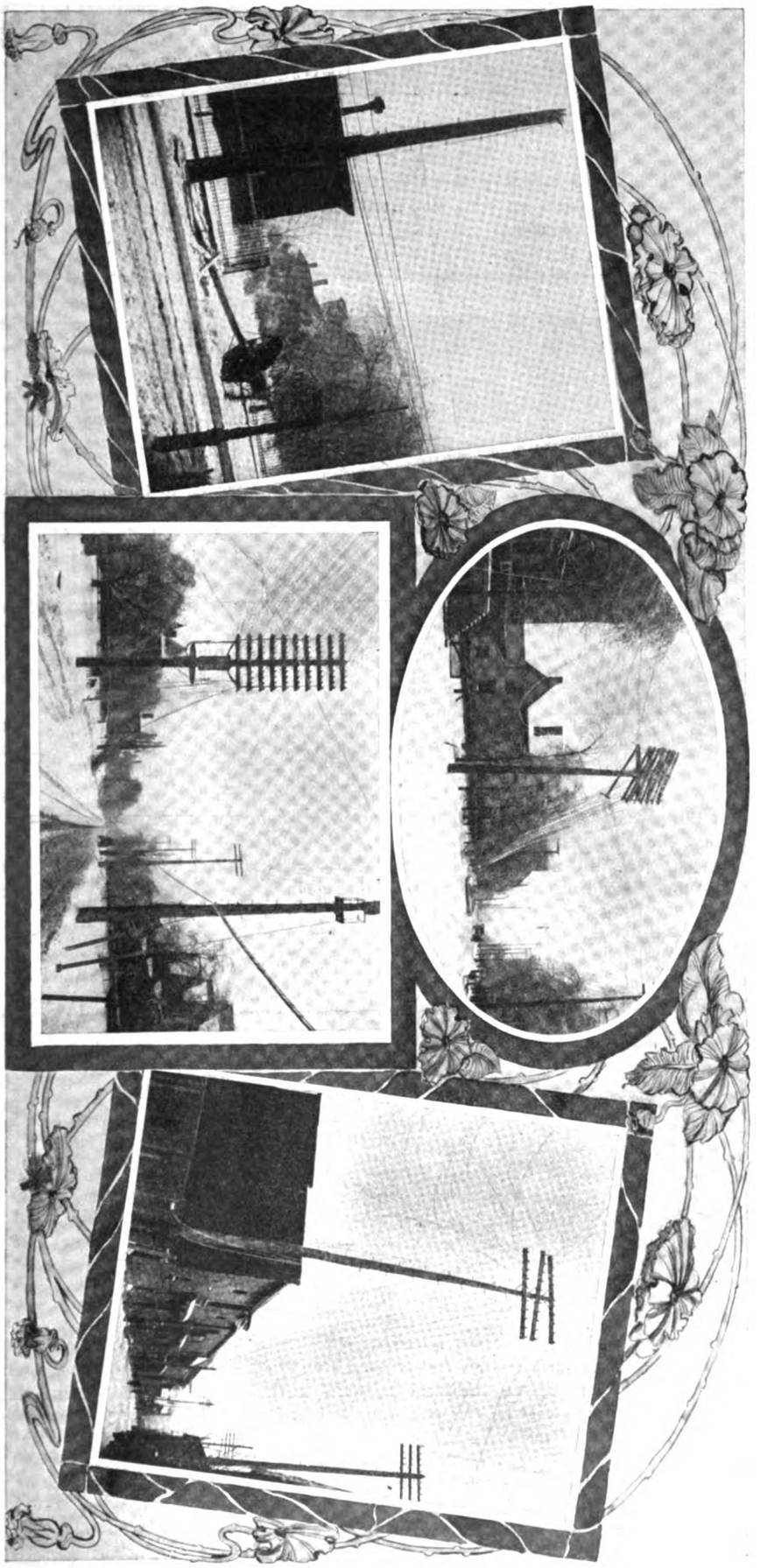

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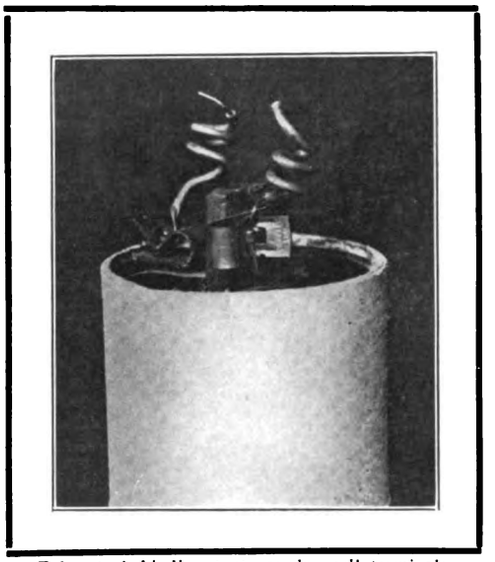
A NOVEL BINDING POST.

THERE has been a demand for a long time for a device to be used as a binding post, which will be simple in design and positive in action. We herewith illustrate an article which appears to thoroughly fulfil these requirements.

It is being manufactured and put upon the market by the Fahnestock Transmitter Co. of 132 Havemeyer street, Brooklyn, N. Y., and is known as the Fahnestock spring binding post. In this post the wire is held by the action of a spring, and we are informed by the company that in its standard size post, which will take any size wire up to and including No. 12 B. & S., the wire is gripped between the two surfaces with a pressure of about eighteen pounds. It points out that with this steady pressure against the wire at all times, there is no possibility of its shaking loose, or as in the screw type of post, becoming loose because of the contraction and expansion of the screw and binding nut.



Fahnestock binding posts as dry cell terminals.

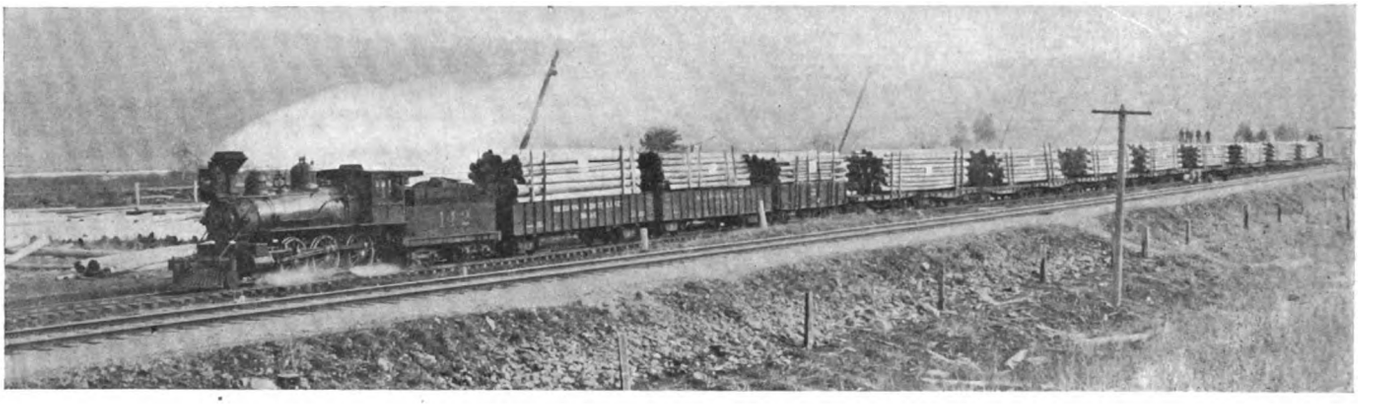
In addition it is claimed that if the wire becomes slightly corroded, the pressure will cut through the corroded part and maintain a metallic contact between wire and post. No tools are needed in order to make the connection, and it is pointed out that this eliminates the possibility, always present in the screw type of post, of shirking the work necessary to make a good and permanent connection. The illustration shows the device as applied to dry batteries, though evidently this is not the only field to which this connector may be applied with advantage. We are informed that the leading battery manufacturers have taken up the device and are now putting out their cells so equipped at no increased price. The manufacturers will be pleased to send a sample of this connector to any party interested upon request.

THE STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY, Rochester, N. Y., reports having closed contracts for switchboards for the following places: Auburn, N. Y.; Bird City, Kan.; McDonald, Kan.; Coldwater, Mich.; Hannah City, Ill.; Pitman, N. J.; Lewisport, Ky.; Huntersburg, Ind.; Ormsby, Minn.; Seattle, Wash.; Arcadia, Mich.; Mulkeytown, Ill.; Tonica, Ill.; Lostant, Ill.; Sinclair, Tex.; Center, Kan.; Mexico, Mex.

A LARGE POLE SHIPMENT.

ONE of the largest shipments of poles ever made was recently dispatched from the yards of Lindsley Brothers Company, at Springton, Idaho, to California points. It consisted of nineteen cars, loaded with fifty-foot poles. This company has one of the largest pole businesses in the West, and ships to all points. Especial interest is attached to the shipment herewith mentioned, on account of the length of the poles, which is considerably above the average. This train, when coupled up, was over a fifth of a mile in length, and was a feature of special interest as it passed along the route. The Lindsley Brothers Company has at its various yards large numbers of poles of various sizes, ready for immediate shipment. The company has offices at Spokane, Wash.; Portland, Ore., and Chicago, Ill., and will be pleased to furnish information from any of these points, to intending purchasers upon request.

THE CONNECTICUT TELEPHONE AND ELECTRIC COMPANY, MERIDEN, CONN., has devised several novel types of intercommunicating telephone apparatus. Special attention is called to its new type of transmitter, also to its deck stand, which are models of mechanical ingenuity in their respective lines. Full descriptions of this apparatus will be furnished to interested parties upon request.



Train load of poles consisting of 19 cars loaded with fifty foot poles en route from the yards of Lindsley Bros. at Springton, Idaho, to California points.

THE DEAN ELECTRIC COMPANY, ELYRIA, OHIO, has recently secured a contract from the Slate Belt Telephone & Telegraph Company of Nazareth, Pa., for a complete common battery central office equipment for its Bangor, Pa., exchange. This equipment is to consist of a standard three-position iron frame switch-

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Beyond Reasonable Doubt

The law says that to convict a man of a crime, his guilt must be proven beyond reasonable doubt.

We say that before a telephone is credited with being equal to Sumter, its equality must be proven beyond all reasonable doubt.

Is that possible? We say no. Why? Because

Sumter Telephones Are Supreme

THE SUMTER TELEPHONE MANUFACTURING CO.

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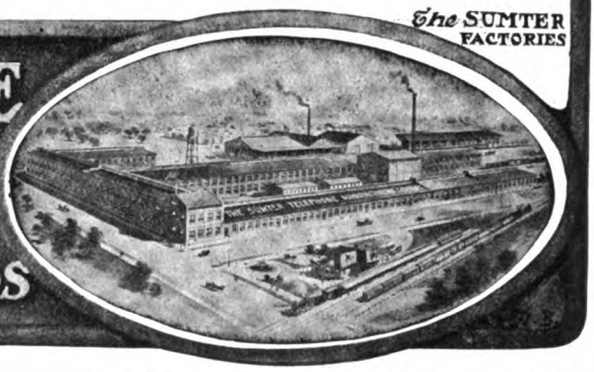
TELEPHONES, SWITCHBOARDS



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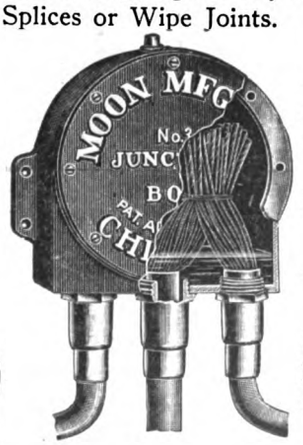
For Aerial or Underground Cable, either Multiple or Direct Distribution tapping out any number of wires, without Sleeve Splices or Wipe Joints.

Moon Junction and Splicing Box.

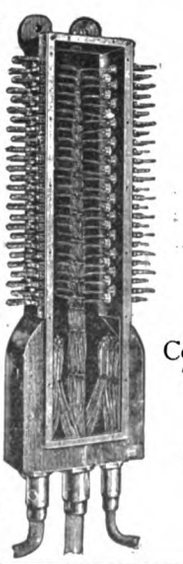


All apparatus equipped with *self-soldering nozzles*, forming solid Cable Joints unequalled by any other method.

Every Cable Splice easy of access.

All cable ends are protected by compound in an hermetically sealed box.

No particular skill required to install it.



Moon Combination Terminal Head and Junction Box

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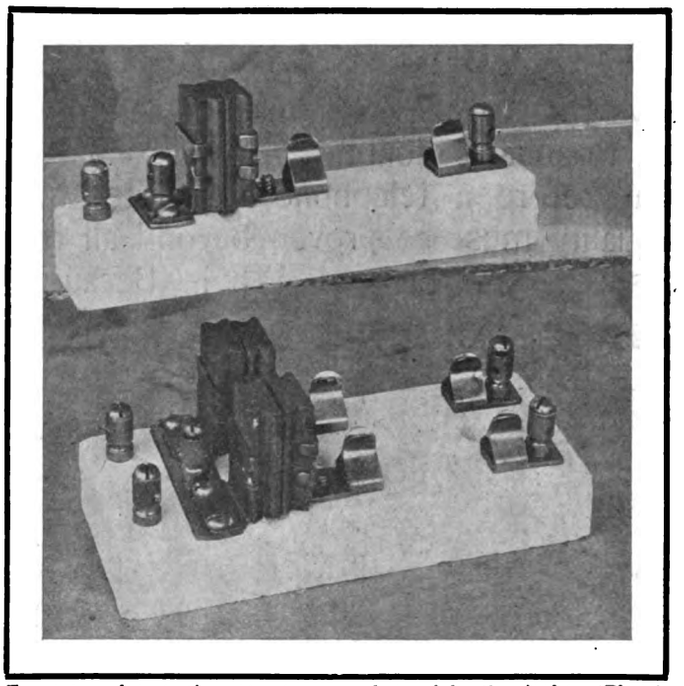
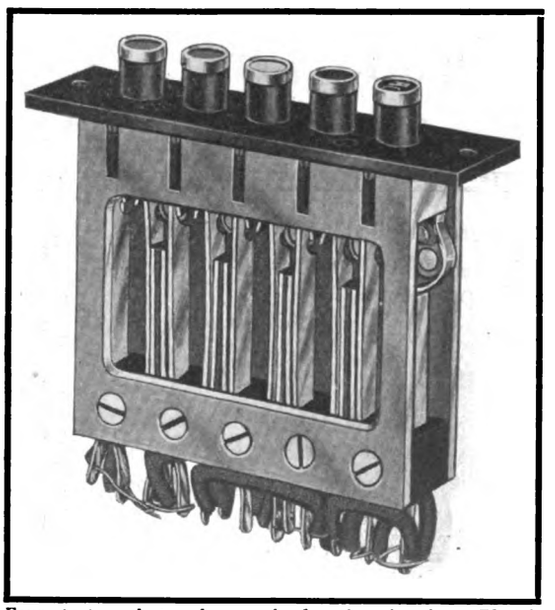
board cabinet, equipped with full lamp signal circuits, and arranged for the new Dean four-party harmonic selective ringing system, indicating ringing keys being provided in each cord circuit for this purpose. This party line system operates on a metallic line circuit without grounds, or third wire connections, and has shown itself in practice to be absolutely non-interfering and is not affected by climatic, or line circuit conditions. These features are vital with the Slate Belt Company, as it intends to make party line operating the profitable part of its business. The officers of the Slate Belt Company who have this installation work in charge are: Conrad Miller, president; L. C. Williams, treasurer, and Rollo Stier, superintendent.



Two types of protective apparatus, manufactured by the Appleton Electric Company, Chicago, Ill.

NEW TYPE LIGHTNING ARRESTERS.

THE Appleton Electric Company, of Chicago, Ill., among its other specialties, has placed a well made, reliable and scientifically constructed lightning arrester on the market. This arrester is made in Western Union or Postal style, and is completed, equipped with fuses, unless otherwise ordered. The open space shown between the carbons gives the entire carbon surface to facilitate discharge. In connection with the carbons, it may be stated that they are adjustable from one-sixty-fourth to one-sixteenth of an inch. They are securely clasped, as shown in the illustration, the degree of separation between them being subject to the voluntary adjustment just described. After they have effected a lightning discharge or if about to be set for service, a card may be inserted between them to remove dust and deposits present in either case. This is a feature of importance, because of the fact that it is not necessary to remove the carbons to clean the device, after a powerful current has passed through. The fuses supplied with this piece of apparatus are "Veribest," unless a special demand is made otherwise. Besides the two types of arresters, as shown in the illustration, this company manufactures several others. The carbons in the improved double pole type are protected from dust by a glass cover. Fuse strip, link fuses, non-arcing fuses, glass tube Navy fuses, bushings, lock nuts and cylindrical wire connectors, comprise but a small part of its category of specialties. These extend into telephone supplies which cover, in addition to lightning arresters and telephone fuses, a long list of the most useful appliances in daily use. The company has prepared a descriptive catalogue which it will mail upon request.



Four party selector key made by the American Electric Telephone Co., Chicago, Ill.

The Baird Manufacturing Company, No. 6 Michigan street, Chicago, claims that its secret service telephone system has demonstrated itself a success, by duplicate orders the company has lately received from the Lincoln Telephone Company, Lincoln, Neb., the Williamstown & Owenton Telephone Company, of Williamstown, Ky., and the Forreston Mutual Telephone Company, of Forreston, Ill. Several customers have expressed their satisfaction with the apparatus and indicated their intention of ordering large numbers of additional telephones shortly. The company makes a liberal trial offer to prove the great faith it has in its system, and it will well pay telephone companies operating rural and party lines to investigate this apparatus. A booklet entitled "Secret Service on Party Lines," which gives much valuable information regarding this system, will be sent free upon request.

AMERICAN ELECTRIC FOUR-PARTY SELECTIVE KEY.

THE American Electric Telephone Company of Chicago is introducing a complete line of four and eight party selective ringing apparatus. The accompanying illustration shows one devise, known as a four party master selective key. It will be observed that this key is provided with five buttons. Each button being so arranged that when it is depressed, the key is held in its downward position and establishes a circuit condition which may be called for in the operation. This piece of apparatus differs from an individual selective key, through its being required to serve as a master selector, for an entire operator's position of interconnecting cord circuits and switches.

Thus: Reading from right to left, when the first button is depressed, it is held in its downward position, as explained above, and places a 20 cycle alternating current upon the tip and sleeve side of the ringing terminals, on each of the interconnecting cord circuits belonging to a given position. If the second button is next depressed, the first button is released, and the second, through being held in its downward position, places a 20-cycle current from the sleeve side of

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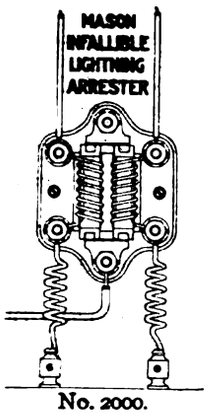


No. 2000.

Lightning Eliminated!!

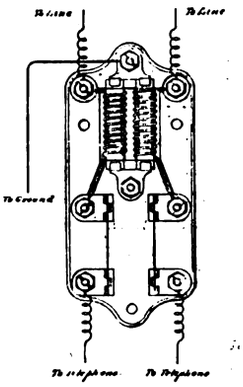
There has never been known a case where lightning has passed

THE "MASON"

Theoretically correct — remarkably efficient — a veritable barrier to lightning. Ask for Bulletin 38-S and prices.

Ewing-Merkle Electric Company

ST. LOUIS, MO.


No. 2001.

The Archambault Kerosene Furnace

—THE—

Central New York Telephone and Telegraph Co.

Syracuse, N.Y., June 23, 1905.

The Archambault Co.,
113 West 125th St.,
New York City.

Gentlemen:-

This is only to say that we have given your furnace a thorough test and find it to be a first class article in every respect I have had this furnace out among several splicers and after they have become familiar with it, they are unable to criticise a single detail.

By the use of this furnace, a large saving in fuel can be effected and with one filling, we find that the kerosene lasts much longer than the gasoline.

No objection is raised by the Insurance Companies to the use of the kerosene furnace in or about buildings, but the same is not true of the gasoline furnace.

After our present stock of gasoline furnaces is exhausted, we shall adopt as our standard the kerosene furnace, and you will undoubtedly receive our orders in the future.

Truly yours,

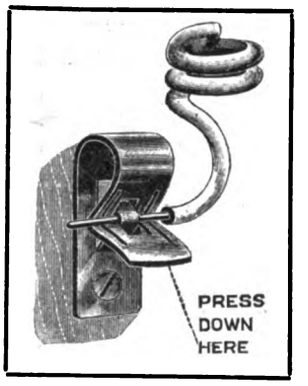
Robert McGillespie.
Cable Foreman.

RMG

Five days after receipt of this letter the above company ordered 24 Archambault Kerosene Furnaces. Write for prices and circular.

THE ARCHAMBAULT CO., 113 W. 125th St., N. Y. City

REMEMBER



Batteries cost no more when equipped with the Fahnestock Spring Binding Post than with the old style Screw Post.

Let us send you a sample. It's free.

Fahnestock Transmitter Co.

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Bugs and Worms Cause Poles and Cross Arms to Break.

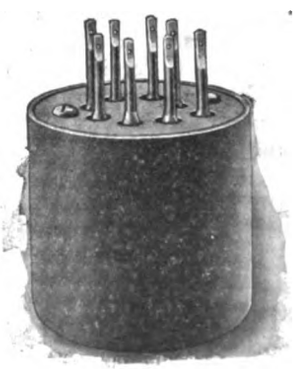
Creosoted Poles and Cross Arms

are Bug Proof, Water Proof and Dry Rot Proof. They cannot decay or break, and last indefinitely.

The trifling greater first cost is saved many times in the longer life gained by the treatment. We sell them and will quote prices gladly. Write for our booklet.

Norfolk Creosoting Co.

NORFOLK, VA.



The mail is quick, the telegraph is quicker, but the "Eastern" ships on the day the order is received and you don't have to wait six weeks for your telephones.

Eastern Tel. Mfg. Co.

West Chester, Pa.

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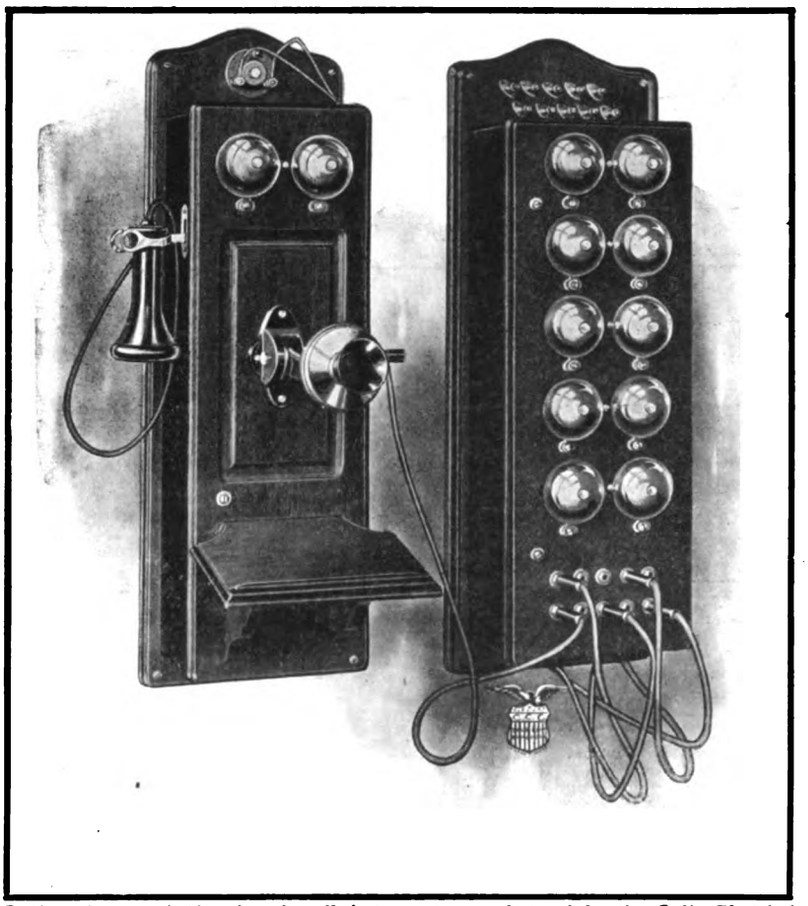
the cord circuit to earth. Upon pressing the third button, a 60-cycle current is placed upon the sleeve, while the fourth button results in placing a 20-cycle current upon the tip side of the cord circuit, and finally the last key to the left, when depressed, places a 60-cycle current upon the sleeve side of the cord.

This key is so constructed that all parts are interchangeable and readily and conveniently handled. All contacts of the key are platinum, and in plain view when the key is lifted from its position in the keyboard shelf for inspection.

C. C. C. DUPLEX CALL SWITCHBOARD.

THE Cadiz Electric Company, of Cadiz, Ohio, has designed a very handsome and compact ringer switchboard for farmer systems and toll line stations. The line circuit contains but a ringer and two simple jacks, and the cord circuit has no keys or other complications. Simplicity has been made a special feature in its design. No drop shutters have been used; instead each ringer movement has a set of gongs with a distinctive tone. The manufacturers believe this to be preferable, as a little practice enables the attendant to select the calling line at once.



Duplex ringer switchboard and wall instrument, manufactured by the Cadiz Electrical Company, of Cadiz, Ohio.

The ringer movement is bridged across the line through one of the jacks and is cut out when the plug is inserted. The second jack on the line contains no contacts other than the sleeve and tip springs. When two lines are connected together one of the connecting plugs is inserted in the upper jack of one line, and the other plug is placed in the lower jack of the second line. This cuts out one of the ringers of the connected lines and leaves the other ringer in as a clear-out signal. The operator connects in on the lines with the plug attached to the telephone. If required, all the lines can be connected together. It is sometimes desirable, at night, to do this to enable special calls to be made. When a night bell attachment is required, this can be provided without resorting to the use of shutters. The switchboard can be equipped with apparatus for ordinary bridging lines, and also for the C. C. C. Duplex Call System. In this system only the bells at the switchboard ring when central is wanted, the subscribers on the line not being called. When a party on one line, calls another on the same line, central is not disturbed.

The C. C. C. Duplex call system is proving very successful and is being rapidly adopted by many exchanges. The company provides the necessary apparatus for converting the ordinary bridging lines now in use to the Duplex call.

THE CENTURY TEL. CONSTRUCTION COMPANY, Buffalo, N. Y., is placing on the market a four party selective system, for either local or common battery exchange work, which, on account of its simplicity of construction, its positiveness of operation, and small cost of maintenance, the manufacturers claim, has met with considerable attention among telephone men.

The principle involved is very simple. With a compact and well constructed selective key, mounted in the switchboard, the operator throws positive or negative direct current on either side of the line desired, whence it flows to the ringer movement, which is susceptible to that current only. The current then passes through the windings of the ringers to a spring mounted on the armature. This rests against a point of the ringer frame connecting with the ground, through which the current travels back to the central office. Immediately upon the energizing of the ringer movement by the direct current, the armature is attracted. It swings toward the magnet cores, causing the springs attached to the armature to leave the point against which it has been resting, thereby opening the circuit and allowing the armature to resume its normal position against the point of contact to ground. In other words, the selective ringer movement is built somewhat upon the principle of the electric vibrating bell.

In common battery, the current discharges into a condenser, which precludes any possibility of a leakage of current to ground over the ringers. The Century company solicits inquiries respecting the system.

THE AMERICAN ELECTRIC FUSE CO., Chicago, Ill., has drawn our attention to a typographical error occurring in our review of the booklet entitled "The Opinion of an Expert." With reference to the average time required to operate the coils it should be: .3 ampere, 23 seconds; .4 ampere, 8 seconds; .5 amperes, 4.3 seconds; .6 ampere, 3.1 seconds; .7 ampere, 2 seconds; .8 ampere, 1.5 seconds; to 1.15 amperes, 1.25 seconds.

THE SUMTER TELEPHONE MFG. COMPANY, SUMTER, S. C., has developed a line of intercommunicating apparatus which possesses several important features. The company wishes to draw attention to the excellency of the woodwork and metal parts, which are designed to give the maximum amount of service with the minimum amount of attention. Further information and bulletins will be sent to parties requesting them.

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Kellogg Switchboard and Supply Co.

CHICAGO, ILL.

Wholesalers of Michigan White Cedar **POLES** *of* QUALITY

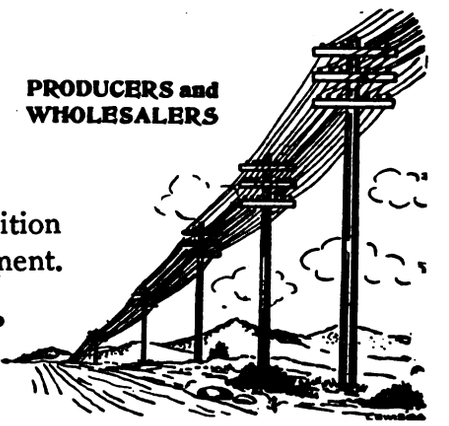
Five Yards *Prompt Shipments*

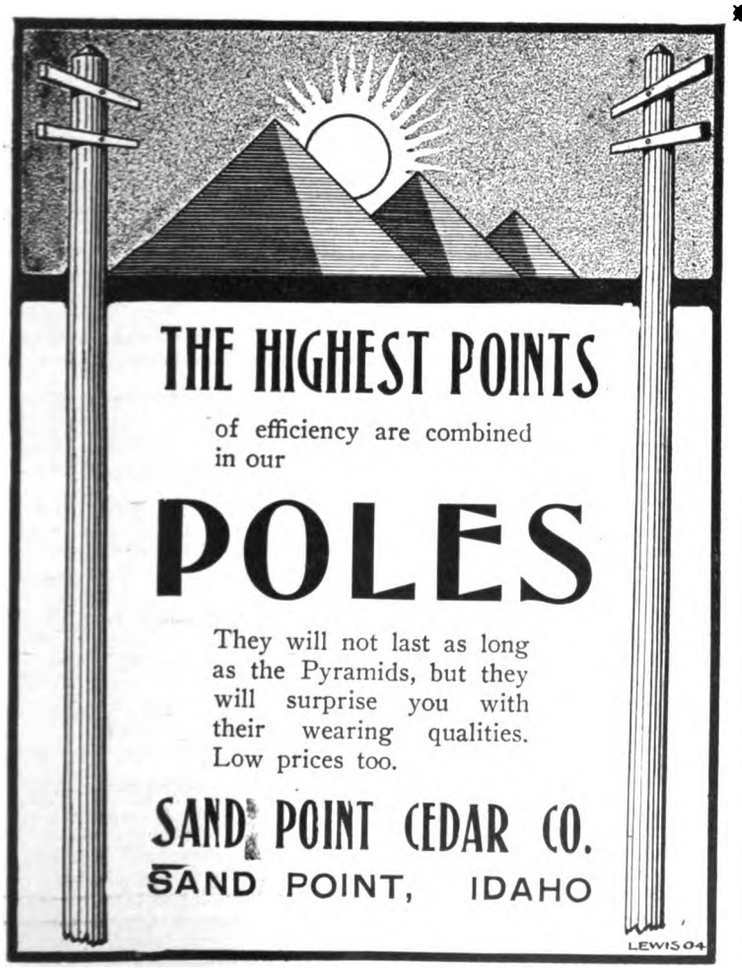
PITTSBURG & LAKE SUPERIOR IRON CO.,
ESCANABA, MICHIGAN.

PRODUCERS and WHOLESALERS

WE always carry a large stock of all sizes of White Cedar Poles, and having yards on all principal railroads in Northern Michigan and Minnesota, are in position to make immediate shipment.

"From the Stump to the Line."





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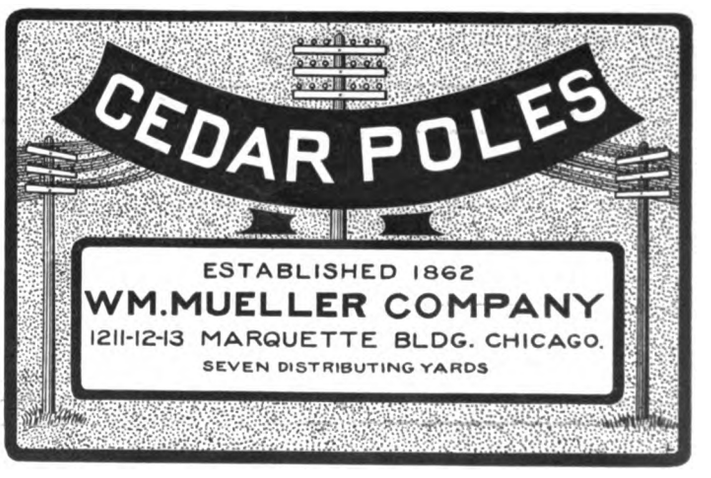
LUMBER EXCHANGE MINNEAPOLIS, MINN.



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THE WEEK'S MESSAGES

FINANCIAL.

MOBILE, ALA.—The Home Telephone Company has increased its capital stock to $350,000, $200,000 of which will be spent in improving its system.

ELKVILLE, ILL.—The Jackson County Telephone Company has increased its capital stock from $2,450 to $21,000.

NOBLESVILLE, IND.—The Home Telephone Company, of Noblesville, has increased its capital stock from $15,000 to $30,000. This step is necessary to provide funds for extending the lines and improving the plant, to take care of the rapidly increasing business. The officers are: Thos. Griffin, president, and Elihu Hawkins, secretary.

HAWARDEN, IA.—The Hawarden Telephone Exchange has increased its capital stock to $14,000.

AUSTIN, MO.—The Austin Inland Telephone Company has increased its capital stock from $22,000 to $50,000.

JOPLIN, MO.—The Home Telephone Company has increased its capital from $200,000 to $750,000.

PHILA., PA.—Stockholders of the Eastern Telephone & Telegraph Company ratified the action of the Board of Directors in issuing $1,000,000 worth of consolidated mortgage bonds. The money is to be used in extending the lines of the company throughout South Jersey.

WILLIAMSON, PA.—The Wayne-Monroe Telephone Company is increasing its stock from $100,000 to $200,000 and will spend the money in extending its lines.

MADISON, WIS.—The Walworth Telephone Exchange Company has increased its capital stock from $2,200 to $4,200.

FRANCHISES.

REGINA, N. W. T., CAN.—The Saskatchewan Telephone Company has applied to the mayor and city council for permission to operate a telephone system in Regina.

CRIPPLE CREEK, COLO.—The El Paso Telephone Company is seeking a franchise at Cripple Creek.

HERMOSILLO, SONORA, MEXICO.—The government of the state of Sonora has granted a concession to E. W. Bristol for the construction and operation of a telephone line from Hermosillo, the capital, to La Colorado. The latter place is one of the most important mining towns in Western Mexico. The property and money invested in the enterprise are exempt from all state taxation for a term of years.

MINACA, STATE OF CHIHUAHUA, MEXICO, Miguel Enriquez and Ramon Sanz have obtained a concession from the government of the state of Chihuahua, to build and operate a telephone line between Minaca and Guerrero.

SANTA ROSALIA, STATE OF CHIHUAHUA, MEXICO.—Antonio Calero has obtained a concession from the government of the state of Chihuahua for the construction of a new telephone system for Santa Rosalia. Carlos C. Leal, federal inspector of telegraphs, is associated with him in the enterprise. The initial plant will consist of 100 telephones.

SILAO, STATE OF GUANAJUATO, MEXICO.—La Compania Noruega Mexicana, with headquarters in the City of Mexico, has obtained a concession from the government of the state of Guanajuato, to establish systems of telephones throughout the state. Christian Schjetnan, manager of the company, announces that the installations will first be made at Silao, Iraquato and Guanajuato. After the exchanges in the cities named have been installed, they will be connected with long distance lines and then installation of system in other towns of the state will be made.

GARFIELD, MINN.—The Farmers' & Merchants' Co-Operative Local Telephone Company, of Garfield, is seeking a franchise at Alexandria.

MANILA, P. I.—J. I. Sabin and Louis Glass, of San Francisco, Cal., have been granted a franchise to construct a telephone system in the Philippine Islands.

ELECTIONS.

BEAVER, IA.—At the annual meeting of the Beaver Telephone Company, all the officers were re-elected by acclamation. They are as follows: President, H. C. Armstrong; secretary, W. C. Sundermeyer; treasurer, R. O. Beaver; trustees, Henry Beaver; Geo. A. Faber and John Folkerts.

ODELL, IA.—The Odell and Sugartree Telephone Company has elected the following officers: Jas. McKahan, president; Howard Milligan, vice-president; O. B. Lanning, secretary; Perry Adams, treasurer; J. P. Lanning, Geo. Adams and H. Milligan, directors.

ABERDEEN, S. D.—At the annual meeting of the Groton-Ferney Mutual Telephone Company, the following directors were elected: One year, M. F. Bowler, Chas. Rossow, N. O. P. Synoground; two years, Charles Schlichtling, Ferdinand Erdmann; three years, W. May, Ever Johnson. Officers: N. O. P. Synoground, president; M. F. Bowler, secretary; Ferdinand Erdmann, treasurer.

NEW COMPANIES.

ATHENS, ILL.—The Menard County Telephone Company has been incorporated with a capital stock of $5,000. Incorporators: Lee Kincaid, W. C. Scott, T. W. Kenyon.

POLO, ILL.—The Polo Mutual Telephone Company has been incorporated with a capital stock of $5,000. Incorporators: C. C. Price, C. W. Hays and others.

PALERMO, ME.—The Palermo Telephone Company has been organized: W. S. Jones, secretary; S. E. Bowler, president; W. W. Turner, secretary-treasurer.

EITZEN, MINN.—The Eitzen & New Albin Telephone Company, of Eitzen, Houston County, has been incorporated with a capital of $3,500. Henry Vonderohe and others incorporators.

LITCHFIELD, N. D.—The Litchfield Rural Telephone Company has been incorporated with a capital stock of $60,000.

WARREN, N. H.—The Baker's River Telephone Company, Warren, has been incorporated with a capital stock of $1,000.

ASBURY, N. J.—A telephone company has been organized at Asbury, N. J., by E. H. Smith, H. M. Riddle, Lewis Fox and others. It will build a line to Norton, Charleston, Hampton Junction and to Glen Gardner.

HIRAM, O.—The Hiram Telephone Company, Hiram, O., has been incorporated with a capital stock of $10,000.

CLEVELAND, OKLA.—The Farmers' Central Telephone Company has been incorporated with a capital stock of $3,500. The incorporators are: E. W. Swallow, J. N. Abshere, J. L. Hohsall, R. M. Bernard and others.

CORBETT, OKLA.—The Citizens' Telephone Company has been incorporated with a capital stock of $10,000. E. M. Abernathy, of Lexington, J. P. Corbett, Wm. Montan and others are among the stockholders.

BELLRUN, PA.—The Bellrun Telephone Company has been incorporated with a capital stock of $6,000. Incorporators: F. E. Gleason, J. J. Roberts, Ceres; L. M. Lanphen, Bellrun.

CLEARFIELD, PA.—The Clearfield & Cambria Telephone Company has been incorporated with a capital of $5,000.. It will build a line from Clearfield to Berwindale. C. L. McMurray, of Allisonville, is the treasurer.

COUDERSPORT, PA.—The Railroad Telegraph & Telephone Company has been incorporated with a capital of $10,000. It will build lines between Coudersport, Potter county, and Susquehanna, Susquehanna county. Benjamin Kuykendall, Jr., of Towanda, is treasurer.

GALETON, PA.—The Galeton & Hull Telephone Company has been incorporated with a capital of $5,000.

SLIPPERY ROCK, PA.—The Slippery Rock Telephone Company has been incorporated with a capital stock of $5,000. John A. Aiken, of Slippery Rock, is treasurer.

LEW, VA.—The North Frederick Telephone Company has been incorporated, with S. E. Brown, president; L. Jackson, vice-president, secretary and treasurer.

PERSONAL.

M. DURHAM has been appointed manager of the Independent Telephone Company at Belton, Texas.

E. W. GORUM has been appointed manager for the Grayson County Telephone Company at Denison, Texas.

GEORGE KING has been appointed manager for the Bell Telephone Company for all Tuscarawas county, Ohio.

J. W. KYLE has been appointed manager for Jefferson county, W. Va., of the United Telephone Company.

CARL M. MAUSEAU, who for some time has been assistant general manager of the Duluth Telephone Company, Duluth, Minn., has been appointed assistant general manager of the Northwestern Telephone Company, with headquarters at Minneapolis. Mr. Mauseau, it is understood, will retain his title as assistant general manager of the Duluth Telephone Company.

J. O'BRIEN, Winnipeg, Manitoba, Can., has been engaged to superintend the work of installing the new telephone system at Crystal City, Manitoba.

P. N. PATTISON has been appointed district manager of the San Luis

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TRADE MARK
REG. U.S. PATENT OFFICE.

1889—Paris Exposition Medal for Rubber Insulation 1893—World's Fair Medal for Rubber Insulation

The Standard for Rubber Insulation

Okonite Wires, Okonite Tape, Manson Tape, Candee Weather-Proof Wire

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INCORPORATED - 1892
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ERICSSON Interior Systems are superior to all others because simple, efficient and easy to install. High grade material used in construction. Prices reasonable. Write for particulars.

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Mfrs. Telephones, Switchboards and Exchange Equipments

296 BROADWAY, NEW YORK

Ward-Leonard Enameled Resistance Units for Telephone Service

Any resistance up to 5,000 ohms on a tube 2 inches long by 7-16 inch diameter.

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Back Braces and Shims

We Galvanize by Hot Process.

Manufactured by

M. LANZ & SONS,
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For Severe Service Use

Bijur "High-Duty" STORAGE BATTERIES

GENERAL STORAGE BATTERY CO.
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J. W. MIDDLETON & CO.

Telephone Stock Certificates
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167 DEARBORN ST. CHICAGO

Michigan and Western **Cedar Poles**

ALL LENGTHS AND SIZES

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EXPANDED METAL, LOCKERS

Sheet Steel Material Closets

MERRITT & CO., 1010 Ridge Avenue PHILADELPHIA

BUTTERFIELD, J. F.

ELECTRICAL ENGINEER and CONTRACTOR

Complete Telephone Exchanges Built and Material Furnished.

Cable Construction and Underground Conduit Construction a Specialty.

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Especially Designed For

TELEPHONE EXCHANGES

Blanks, Books and Forms for Telephone Exchange and Toll Line Bookkeeping and Accounting

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Write for Sample Forms and Prices.

The Telephone Printing Co.
DEFIANCE, OHIO.

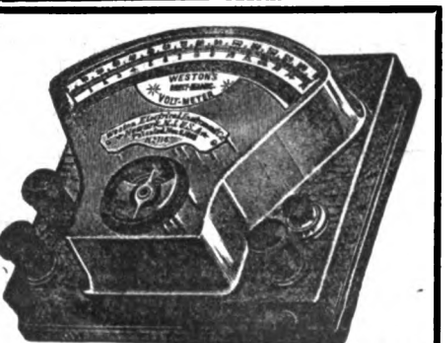
WESTON STANDARD PORTABLE DIRECT READING

Voltmeters, Ammeters, Millivoltmeters, Voltammeters Milammeters, Ohmmeters, Portable Galvanometers, Ground Detectors and Circuit Testers.

Our Portable Instruments are recognized as THE STANDARD the world over. Our STATION VOLTMETERS AND AMMETERS are unsurpassed in point of extreme accuracy and lowest consumption of energy.

Weston Electrical Instrument Co.,

Main Office and Works, Waverly Park, NEWARK, N. J.
Berlin—European Weston Electrical Instrument Co., Ritterstrase, No. 88.
London—Elliott Bros., Century Works, Lewisham.
Paris, France—E. H. Cadiot, 12 Rue St., Georges.
New York Office, 74 Cortlandt Street.



Weston Standard Portable Direct Reading Voltmeter.

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No. 309 Reversible Combination Wire and Sleeve Clamp.
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KLEIN'S TOOLS ALWAYS GIVE IT
MATHIAS KLEIN & SONS
79 W. VanBuren St., Chicago, Ill.

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THE WEEK'S MESSAGES—*Continued.*

valley business of the Colorado Telephone Company, succeeding M. B. Clot, with headquarters in Alamosa, Col.

W. P. POSEY, of Corsicana, has been elected manager of the Independent Telephone Company's system in Taylor, Texas.

WILLIAM E. THIEROFF, superintendent of the Home Telephone Company, at Gas City, Ind., has resigned the position, to take effect August 15.

E. E. THOMPSON has been appointed manager for the Iowa Telephone Company at Des Moines.

H. B. WILLARD, for some time past the city manager of the Duluth Telephone Company, at Duluth, Minn., has been advanced to superintendent, and will have the management of the Duluth company and the Mesaba Telephone Company, which operates on the ranges.

MISCELLANEOUS.

WINNIPEG, MAN., CANADA.—Robert Rogers, provincial minister of public works, will introduce a bill at the next session of the legislature for provincial ownership of all telephones in Manitoba.

MOOSEJAW, N. W. T.—C. A. Gass, owner of the local telephone company has sold out all his rights and privileges to an American syndicate. The new company is being organized by Senator Young, of Valley City, N. D., and Chas. Thomas, of the same town will be the new manager.

SAN LUIS POTOSI, MEXICO.—The new telephone line which was recently completed between San Luis Potosi and Villa de Armadillo has been placed in operation. The inauguration of the line was made an event of much ceremony, the governor of the state, Jose Maria Espinoza y Cuevas, being present. It is said to be one of the best constructed lines in Mexico.

OTTAWA, ONT.—Reports received from towns and villages throughout the Dominion show that the people are greatly in favor of municipal or Independent telephone systems instead of one organization operating all over the country and demanding excessive rates.

NEWVILLE, PA.—The Bloserville Telephone Company's line, running through the section of the Cumberland Valley, between Newville, Pa., and Entlerville, Pa., has been completed. It will become a part of the United Telephone & Telegraph Company's system.

NASHVILLE, TENN.—J. D. Russell, manager of the Cumberland Telephone Company at Hopkinsville, Ky., and seven members of a construction gang, have been arrested at that place, charged with persistently cutting the wires of the Home Telephone Company.

GRATIOT, WIS.—The Crosby-Blaisden Telephone Company has changed its name to the Lafayette County Telephone Company, with Gratiot as headquarters.

UNDERGROUND.

FULTON, IA.—The Common Council has been asked by C. A. Nichols, representing the Empire Telephone Company, for a franchise to install an underground conduit system.

New Construction in the Field

DECATUR, ALA.—The Morgan County Telephone Company, which owns lines in other Southern cities, is building a long distance line from here to Mobile, via Birmingham and Montgomery. It has practically been completed from Decatur to Cullman, thirty-three miles.

GREENBRIER, ARK.—The Greenbrier Telephone Company is to build a line into Conway.

LITTLE ROCK, ARK.—The Ward Telephone Company is putting in a new switchboard and otherwise improving its system.

MARION, ILL.—The Marion Telephone Company, of which J. B. Bundy is manager, has begun the construction of a telephone line from Marion to the Saline county line, a distance of fourteen miles, where it will connect with the Harrisburg Telephone Company lines.

ROCKFORD, ILL.—The Winnebago County Telephone Company is to build a line to New Milford.

WATERLOO, IA.—Plans have been completed for the new central office of the Corn Belt Telephone Company. They contemplate a building 48 feet by 48 feet in dimension and three stories high to be built of brick. Work on the improvement will be begun at once, and later an additional three-story building of the same dimensions will be built.

CELAYA, STATE OF GUANAJUATO, MEXICO.—A new telephone system is to be installed in the city of Celaya, by a syndicate of capitalists, who have obtained a concession from the state government for the purpose.

COMPOSTELA, TERRITORY OF TEPIC, MEXICO.—A telephone line is to be constructed from Compostela, territory of Tepic, to El Rosario, state of Sinaloa. The line is to be built under direction of the government of the territory of Tepic. It will be used principally for the dispatch of public business relating to affairs of the territorial government.

SOLEDAD, STATE OF VERA CRUZ, MEXICO.—A telephone line is being constructed from Soledad to Huatusco, state of Vera Cruz. It will afford communication for a number of ranches with these towns.

COMFREY, MINN.—The Comfrey Rural Telephone Company has its local exchange and rural lines nearly completed. The officers of this company are J. A. Prim, president; C. L. Tindersmith, vice-president; Oscar Erickson, treasurer. The company will start out with about seventy-five telephones.

GRANITE FALLS, MINN.—The Granite Falls Telephone Company will at once commence the construction of a line in that city and to the adjacent country.

GENEVA, N. Y.—The Geneva Telephone Company is building lines to Oak's Corners, and also to Experiment Station.

NORTH CREEK, N. Y.—The North Creek Telephone Company is to build a line to Harrisburg.

SCHENEVUS, N. Y.—The Schenevus Telephone Company is to extend its lines from Schenevus to Westford.

WILMINGTON, N. C.—The Wilmington & Southport Telephone Company is to make improvements in its line to Southport.

CLAYSVILLE, PA.—The Claysville Telephone Company has some extensive improvements under way which, when completed, will make the company one of the most Independent companies in Washington county.

AUSTIN, TEXAS.—The Texas Telephone and Telegraph Company, which has its principal office at Austin, will make important extensions and improvements before the close of the present year. The company is now extending its toll lines to Brady and Georgetown. It recently completed the construction of extensions to Castell and other places. Its lines now aggregate 700 miles. C. C. Gibbs, of San Antonio, is president; W. R. Hamby, of Austin, vice-president, and A. G. Miller, of Llano, superintendent.

DALLAS, TEXAS.—The Texas Consolidated Long Distance Telephone Company which was recently granted a franchise by the city council of Dallas, will build a line between Dallas and Fort Worth, and will tap a number of towns between the two cities. Other important extensions and improvements are contemplated by the company.

SHERMAN, TEXAS.—The Grayson County Telephone Company, which has its headquarters at Sherman, will extend its long distance lines to a number of towns, among them being Howe, Van Alstyne and McKinney.

KAUKAUNA, WIS.—The Fox River Valley Telephone Company, of Appleton, is to install an exchange at Kaukauna.

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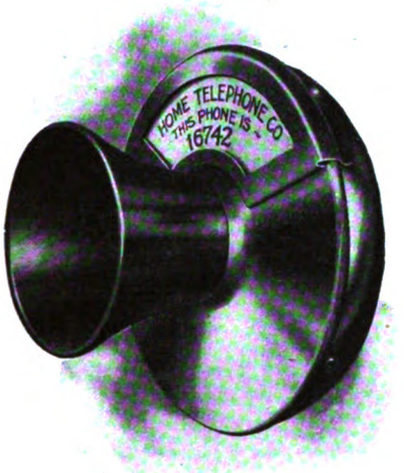
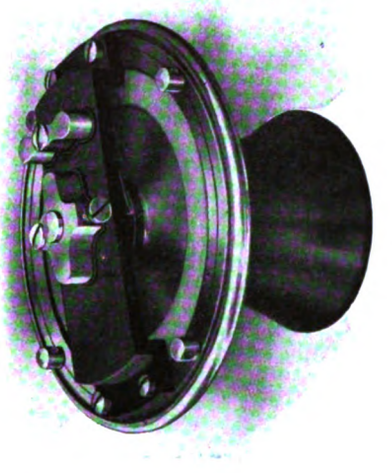
New Dean Transmitters



Front View showing Cord Holder.



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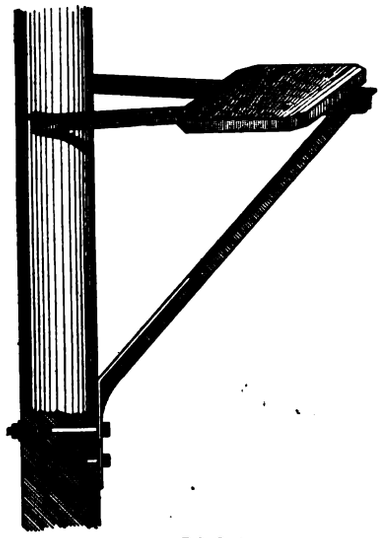

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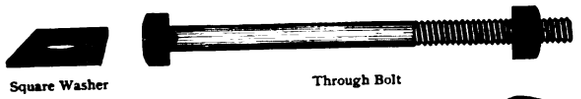

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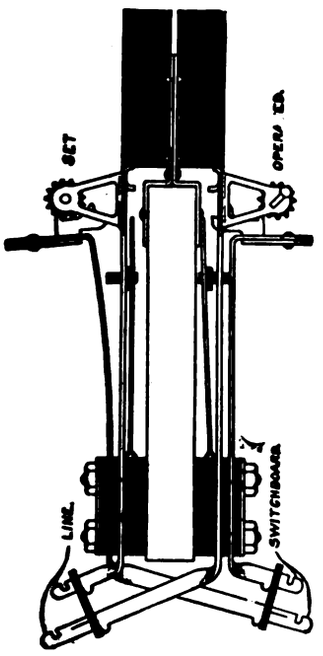

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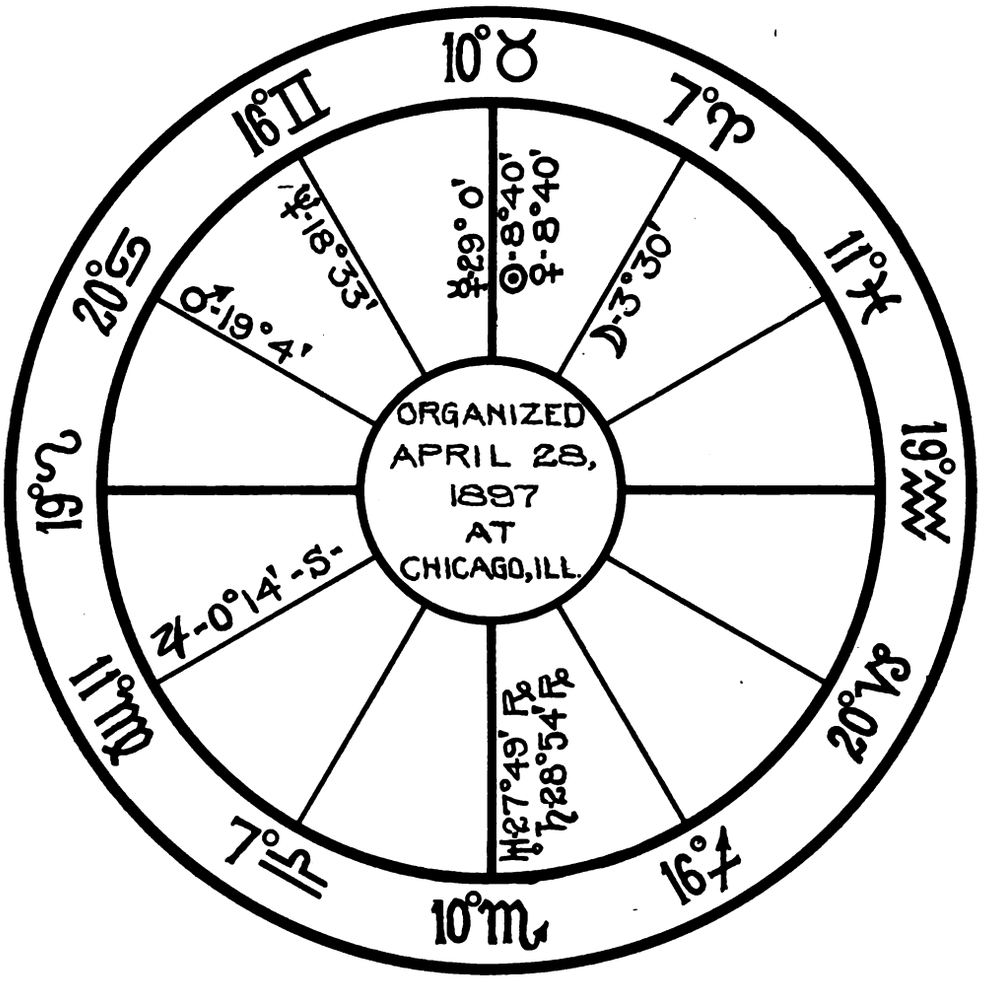

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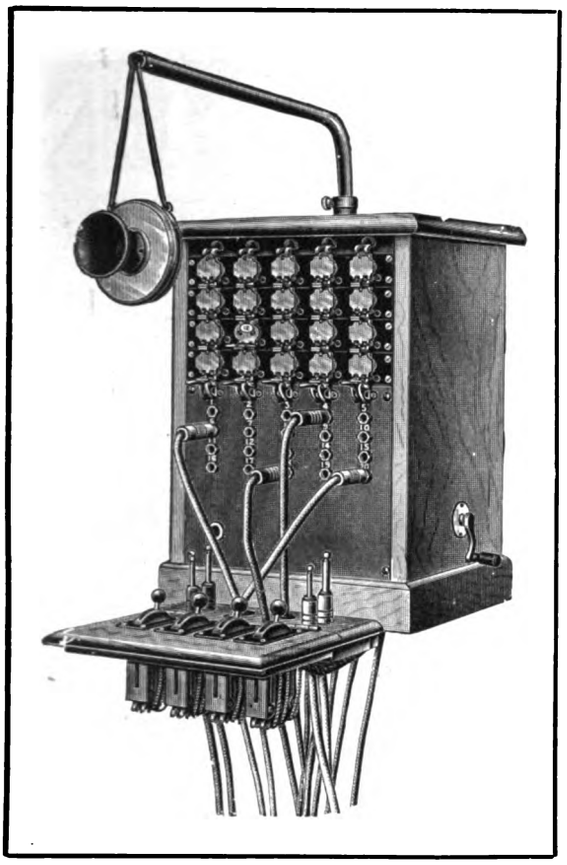

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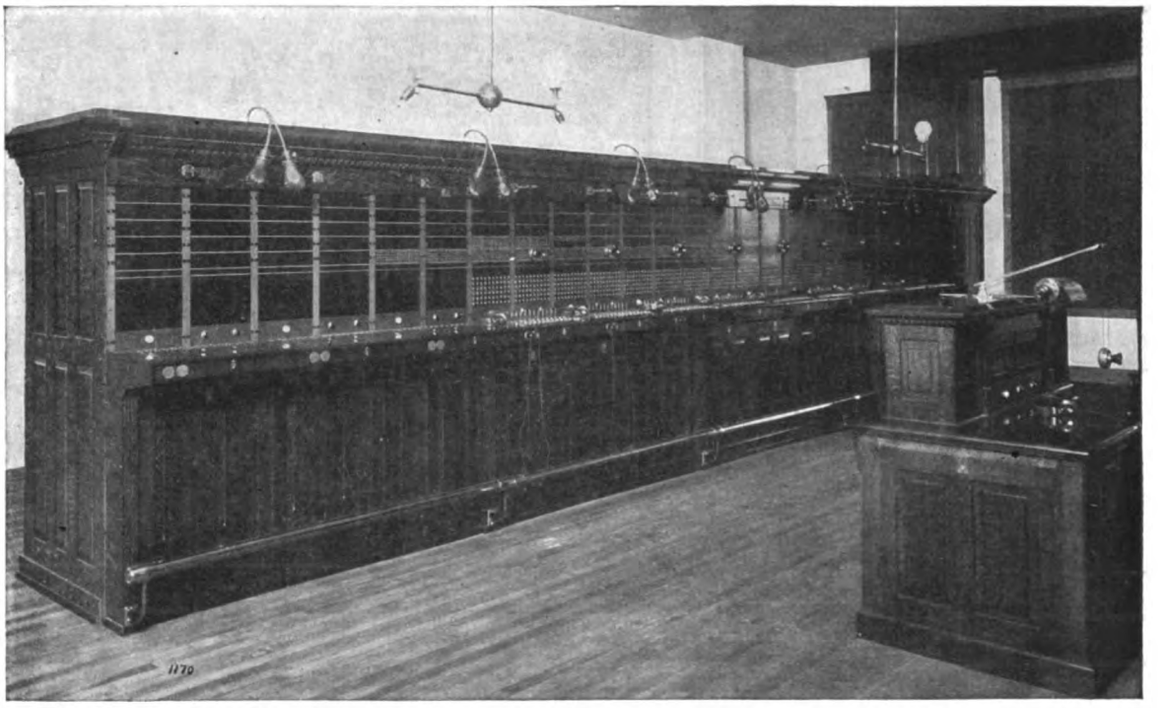

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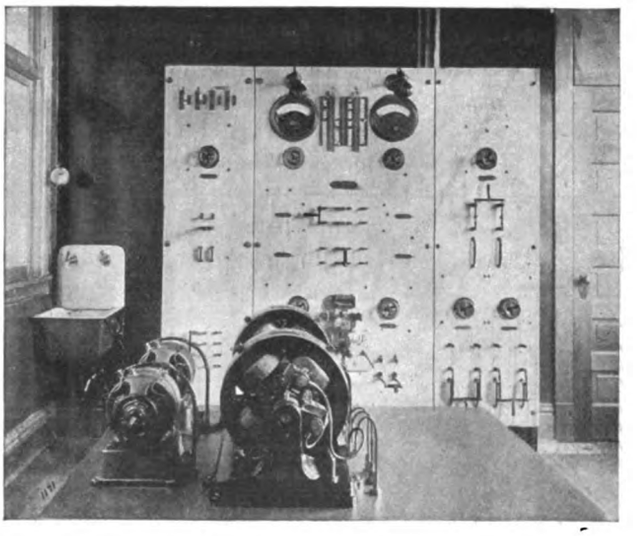

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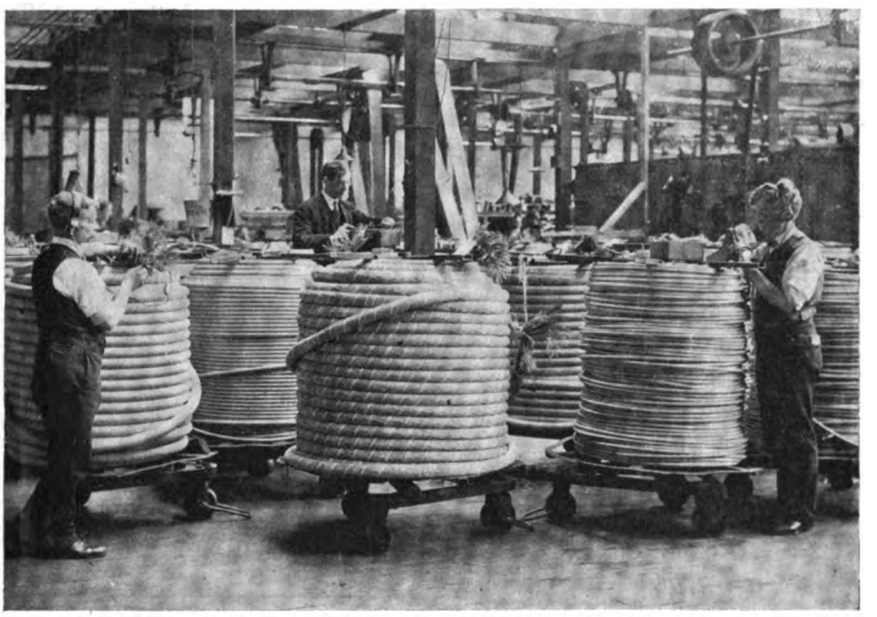

In last week's issue of this paper we illustrated our cable core machines and told how we manufacture cable core.

This illustration shows the finished core being tested for opens and crossed wires. This is a simple process familiar to most telephone men. The only apparatus required being two dry cells and a telephone receiver.

In testing for opens the connections are so made that a click in the receiver indicates a *continuous* wire. While in testing for crosses the absence of a click denotes a *perfect* wire. If a fault is discovered by the above tests it is located by a Wheatstone bridge.

The central figure shows one of our electrical experts performing such a test. The essential thing in these tests is to have a perfect cable core as it is the last mechanical operation before being leaded.

In next week's issue we will tell something about drying cable core.

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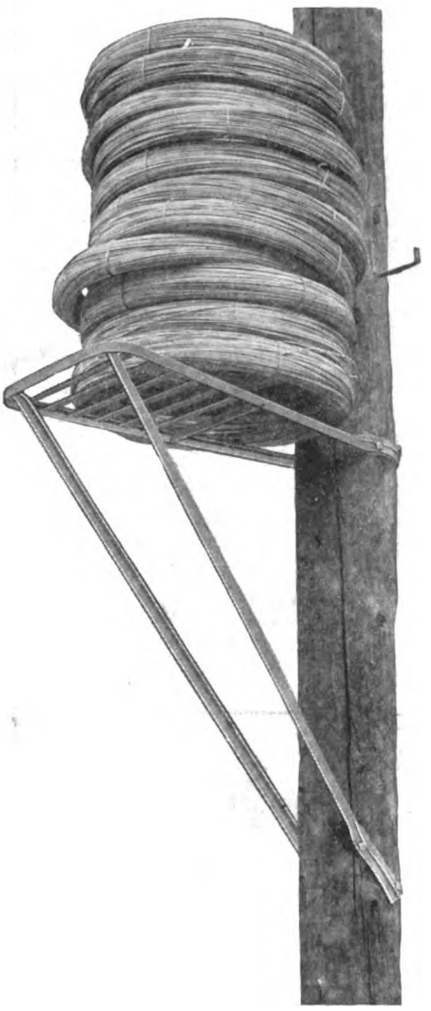

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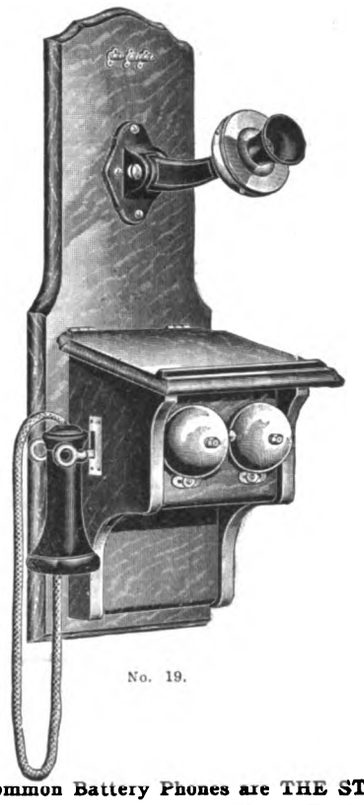

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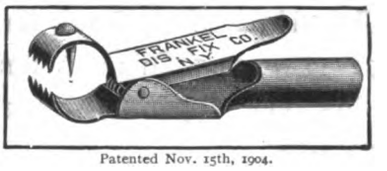

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VOLUME XII *SATURDAY, JULY 29, 1905.* *NUMBER 5*

Anti-Earthquake Telephone Conduits in Mexico

By J. Sitzenstaller.

PECULIAR subterranean conditions existing in the City of Mexico have necessitated the employment of novel and unique methods in subway construction. The soil of Mexico, and the whole valley in which the capital is situated is anything but solid. Water is found almost anywhere at a depth of 3 feet, and unless special foundations are made at great cost, anything placed into this soil, settles until the force of ground water or seismic undulations raise it again. This continuous movement would make it very hazardous to use the usual short earthenware ducts, so generally employed in underground construction. The system adopted by L. M. Ericsson & Co., the engineers, is similar in general details to the methods they have employed in Russia and Sweden, which consists of round blocks of cement with multiple ducts running through them, with male and female flanges. These are fitted into one another like ordinary drain pipes, the joint being filled in with hot asphalt.

Fig. 1. Lowering the block concrete ducts into the trench in the City of Mexico.

The conduits are made of a mixture of one part of best Portland cement to three parts of sand, well tamped in steel moulds in length of 39 inches. The number of ducts varies according to requirements, 4, 7, 19 and 37 duct conduits being the types most generally used. The inside diameter of the ducts varies from 2.6 to 4 inches. The principal lines are laid out with the last named three types, viz.:

37 pipe-conduit, resistance against outside pressure, 88 lbs. per square inch. Weight, 330 lbs. per foot. Outside diameter: M. O. 28 inches.

19 pipe-conduit; resistance against outside pressure: same as above. Weight, 158 lbs. per foot. Outside diameter: M. O., 21 inches.

7 pipe-conduit, resistance against outside pressure same as above. Weight, 79 lbs. per foot. Outside diameter: M. O. 14.2 inches.

The blocks are laid on the floor of the ditch, which has previously been well levelled and rammed down, and then fitted into the flanges of the adjacent ones by means of a key which projects from the rim of one and fits into the corresponding opening in the head of the other block. This insures, that the conduit orifices are always in a true line. They are then caulked with tarred hemp, and the remaining space is filled in with hot asphalt, which lends them enough elasticity to follow the slight undulations of earthquakes and still assures a watertight joint.

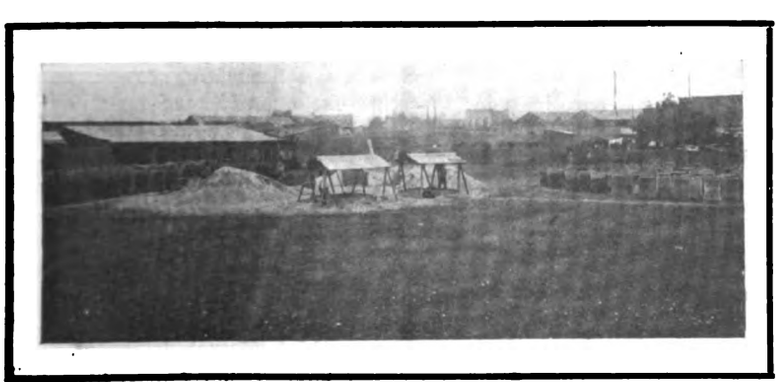

Fig. 2. Factory plant of the L. M. Ericsson Co. for the manufacture of conduit ducts.

The L. M. Ericsson Company, of Stockholm, Sweden, has acquired the concession for the underground system in the federal district, and has established a factory complete in all details in the northern part of the city for the manufacture of these ducts.

In the illustrations, Fig. 2, depicts the yard in which the conduit tubes are made. This is a very large space of ground, and here the sand and other materials which

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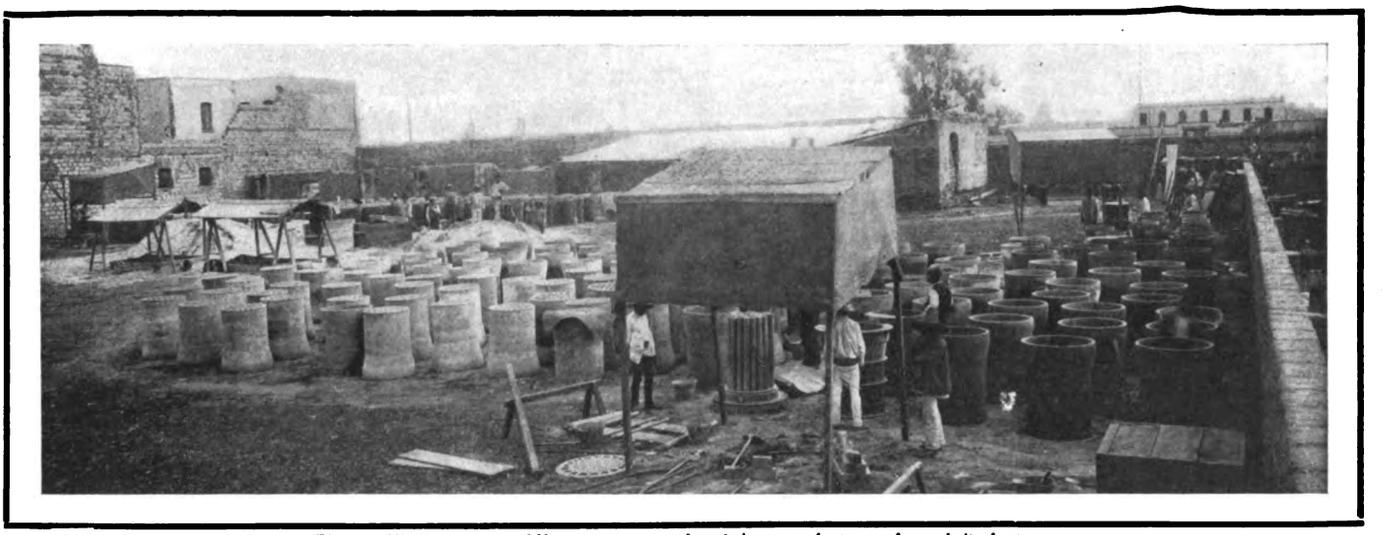

Fig. 3. Illustrating moulding process employed in manufacture of conduit ducts.

are used in the manufacture of the conduits are stored and prepared for the forming process. Fig. 3, illustrates the method of manufacture. Beneath the wooden shed will be seen an upright consisting of several steel bars fitted into a circular base. This constitutes the core of the mold, which fits into a circular jacket. The concrete is packed very thoroughly around the upright rods, and after the required amount of material has been forced into the structure, the iron framework is withdrawn, and the conduit in its green state is stood upright on end, for the setting process. This setting process requires from 27 to 30 days for its completion. To permit a large circulation of air around the conduit blocks, they are spread over a large area of land, the space between the conduits being large enough to permit a man to pass through the rows and sprinkle them thoroughly and separately each day. This work continues without interruption day and night. During the first few days the blocks are very fragile, lacking cohesiveness and require careful handling, but at the end of the period of setting and hardening, they can be moved without the slightest risk.

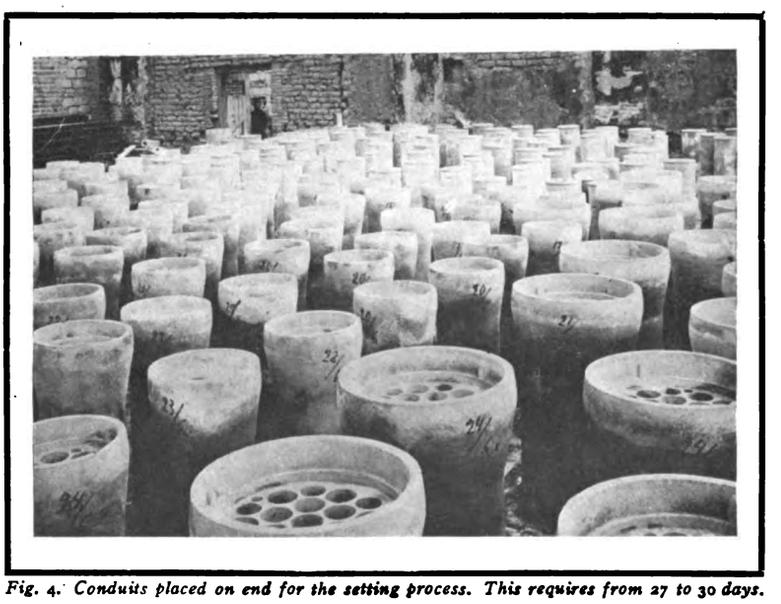

Fig. 4. Conduits placed on end for the setting process. This requires from 27 to 30 days.

Fig. 4 shows the blocks laid on end for the setting process. It can be noticed that each block is marked with numbers. These indicate the day it was made, so that there will be no confusion in selecting blocks which have undergone the required period of setting. The first illustration shows the method of laying this conduit. Due to the size of the conduit, the ordinary method of duct construction is not practicable in this case, and it becomes necessary to use a block and chain falls supported by a tripod, to lower the ducts with proper care into correct position in the trench. The large size of these conduit blocks is indicated at the right hand side of the picture, where an observer is to be noted leaning against one of them. About 600,000 feet of this kind of conduit will be laid.

The total capacity of the ducts leading out of the central exchange is more than 40,000 metallic circuits. No grounded circuits are allowed in the system.

The central energy switchboard, which is being made in Ericsson's big factory in Stockholm, will be provided with all the latest and most approved appliances. It was designed after the Moscow, Warsaw and Hague boards, which this firm installed.

The distribution of subscribers' lines in the central part of the city will be almost exclusively underground, and so will all the trunks, connecting the suburban exchanges, located in the outlying towns of the Federal District with the main central office in Mexico City.

Climatic conditions in Mexico are such that in all cases of telephone installations, particular care must be exercised to provide against such contingencies as those arising from unusually heavy rain. For this reason conduit construction involves other questions besides those of mere strength and durability. Many instances have occurred, in which the mechanical stability of installation have been well provided for, but on account of their peculiar nature and the fact that certain electrical requirements had to be met, the ultimate mechanical solidity occupied second place. In this respect, it may be stated, particularly in relation to conduit construction, that the question of the insulation resistance of the conduit is a matter of primary importance, despite the fact that cables when laid are well protected against the expected conditions that prevail in ordinary localities.

It is well known that the meteorological conditions in Mexico are very variable and unusual, and that at times tremendous rainstorms cause inundations which seriously threaten the integrity of the best installed equipments. It is necessary for this reason, to provide electrical protection against leaks and grounds as far as possible, in order to secure the uninterrupted operation of the service. South American countries, including Mexico, call for unusual care in installation in this respect, and it is admitted by engineers, that whereas during one season of the year unusually good conditions exist for the successful operation of exchanges, during the second or rainy; these are just the opposite. Provisions have been made in the construction of the conduit described to offset these difficulties. These are to be found in the insulation resistance of each individual element, and in their immunity from the effects of unusual dampness.

It is expected, that the whole underground construction will be finished within twelve months.

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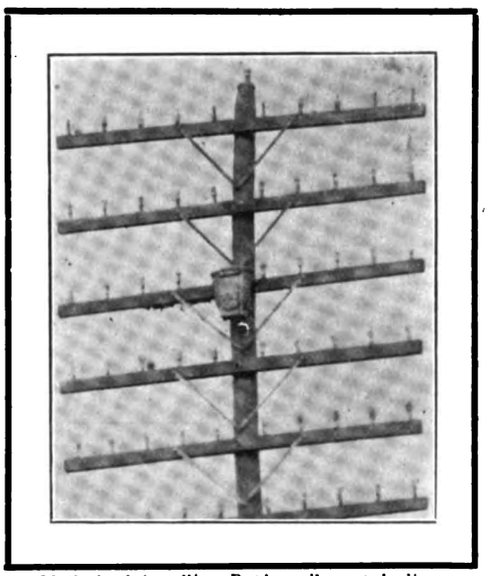
Loading Telephone Lines for Long Distance Service—Article II

By Newton Harrison, E. E.

THE Pupin Coil.—The Pupin coil, or as it is commonly called, the "load coil," is an electro-magnetic device by means of which the highest important overtone of the human voice is preserved in a telephone circuit. Upon the strength of this overtone depends the clearness of the message, and as the Pupin coil gives it a comparatively free path, with few weakening influences, the coil has proven to be of infinite value in long distance telephony.



Method of installing Pupin coil on pole line.

In appearance the coil resembles a thick ring of brown wax with four terminals protruding. The standard size is about six inches maximum diameter, with an opening in the centre of one inch. The coil is composed of an iron core (Fig. 13), made up of very fine soft iron wires, wrapped with insulating material and wound quite heavily with medium sized copper wire. Over this is smeared a thick coating of brown wax.

The wire is wound on the core in such a way that it produces two magnets, each a half circle, with their opposite poles adjacent, thus forming a perfectly complete magnetic circuit.

The coil is suspended in the centre of a large iron box (Fig. 14) similar to that of a transformer, and moulten paraffin poured in until the box is entirely filled. In this manner the coil is protected on every side by a thick wall of paraffin. The four terminals are connected to wires which pass through tight bushings and bend into rain loops before connecting to the line wires. The iron top of the box is bolted and makes the whole waterproof.

The coil is connected in series with the line, each half carrying one leg of the line circuit. For sake of example, the arrangement might be said to resemble two pairs of telegraph magnets, each pair in series with one side of the line and having their opposite poles placed together.

The whole apparatus is iron clad, weighs about fifty (50) or sixty (60) pounds and is secured to the crossarms by means of bolts.

These load coils are placed in the line about one (1) to two and a half (2½) miles apart, the distance depending upon local line conditions. They operate poorly in very wet sections of the country, furnishing a leakage point wherever installed. In cable work, on the contrary, they are especially fine, being of much assistance in reducing the influence of the moisture, which with the line forms a condenser of great capacity.

The Pupin coil is being used very extensively and is rapidly becoming one of the essential factors of telephone engineering.

Wave Length of the Highest Important Frequency.—The highest important frequency in telephony is computed at 750 periods a second. The length of the wave (Fig. 15) corresponding to this is 14.6 miles. In the experimental work of Pupin a reactance coil (Fig. 16) having an inductance equal to .056 henry and a resistance of 9 ohms was placed at the end of each mile of the line. The effect of this was to create within the line the same conditions to within one per cent. of those observed in a practically perfect telephonic line. As regards the conditions existing, which in an electrical sense invite the presence of electric waves, the following quotation from Dr. Pupin is highly instructive: "Transmission of electrical energy over conducting wires is a wave transmission, when the distance between the transmitting and the receiving apparatus is sufficiently long to permit the development of electric waves. If, however, a long transmission line is involved, the transmission is no longer direct. The energy is first stored up in the medium surrounding the line and thence is transferred with some delay to the receiving apparatus. While stored in the medium it exists there partly as magnetic energy stored in the field of magnetic flux, and partly as electrical energy stored in the field of electrical flux. The process of propagation consists in the progressive transformations of the magnetic into the electrical energy and *vice versa*. The expression, 'electrical wave,' is nothing more or less than a brief statement of the physical fact that, in the case under consideration, the energy which at any moment is stored up in the medium surrounding the transmission line is distributed periodically over this line."

Effect of Coil on Lower Frequencies.—The term frequencies employed in connection with waves implies the rate at which they occur per second. In a complex assortment of electric waves, such as appear in a line transmitting speech by electricity, a variety of waves necessarily appear. These waves are not of anything like the same frequency. Therefore if attention is paid to the highest important wave in the use of the Pupin coil, the question which naturally arises is, "What happens to the waves of lower frequencies?" The answer to this inquiry is obvious. The adjustment of the line to a given high frequency and length of wave (Fig. 17) means, as Pupin himself states, that its approximation to a uniform conductor, to an even greater extent than before, will be closer for all lower frequencies. In other words, the introduction of inductance along the line at stated intervals clears the line for the higher frequencies and also improves it for those lower as well. It is this innovation which has been the means of clearing away all practical and theoretical objections to its extensive application.

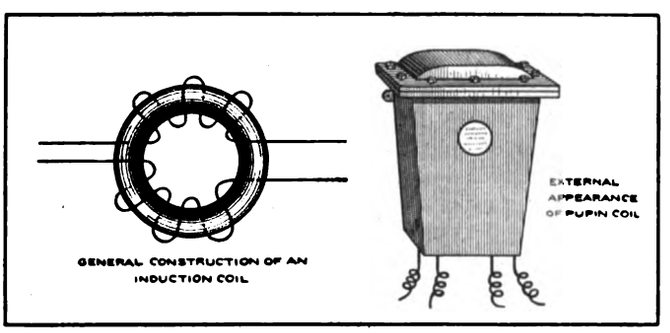


Fig. 13. *Fig. 14.*

The Two Constants.—It is necessary, therefore, to be cognizant of the length and frequency of the most important wave transmitted (Fig. 18) and in addition to be in possession of the value of the *attenuation constant*. A knowledge of this last constant will be the means of determining the degree of attenuation or the amount of decay of the current from the transmitting end to the receiving end. For the purpose of presenting this all important element in its original form, as given by the master of this

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art of long distance transmission, the following symbols are employed:

n = the frequency speed.
C = capacity per unit length.
L = inductance per unit length.
R = resistance per unit length.
B = attenuation constant.

Then B equals the square root of $\frac{1}{2}$ n C $\times$ $(\sqrt{n^2 L^2 + R^2} - n L)$ or in complete form

$$B = \sqrt{\tfrac{1}{2}\, n\, c\, [\sqrt{n^2 L^2 + R^2} - n L]}$$

A further development of this formula, where the inductance is large in comparison with the resistance, gives a simpler form:

$$B = \frac{R}{2} \sqrt{\frac{c}{L}}.$$

In this last case the frequency is not considered, the attenuation becoming independent of it. The attenuation constant thus becomes equal to one-half the resistance multiplied by the square root of the capacity divided by the induction.

The physical meaning of this has already been presented, yet its reiteration will serve to emphasize the improvement in a line by the addition of an appropriate inductance. The distortion occurring through the absorption of important speech transmitting waves is obviated. The important higher frequencies and the waves producing them are preserved in practically all their integrity. The result of this is the object kept in view. It is by this means that the probabilities of transcontinental speech are awakened. It is this method that may place London, Berlin and Paris in telephonic communication with New York.

Recapitulation.—The principle of loading a telephone circuit with Pupin coils is thus dependent upon a consideration of

First—Acoustic principles.
Second—Electrical difficulties.
Third—The remedy applied.

The correct digesting of the facts discloses the imperative necessity of supplying coils to the line at stated intervals. These intervals are, according to practice, a definite percentage of the wave length that is preserved and upon whose length and frequency the coil is designed. The application of these coils had been tried before, but failure resulted. The position of them was determined entirely as the result of mathematical analysis. As Dr. Pupin states: "The position of the coils should be considerably smaller than one-half the wave length of the wave to be transmitted. The feature of selecting a certain high frequency and wave, the preservation of which meant clear speech, is in itself an intellectual victory. But with the accomplishment of this purpose, the correct design of the coil and its application at the properly calculated intervals, a great engineering feat was completed. Science thus yields interesting possibilities, but their crystallization calls for faculties which when successfully applied constitute in a great measure the genius of mankind.

Fig. 15.

Fig. 16.

A Junction Box for Intercommunicating Telephone Systems

BY HAROLD A. MCMANN.

IN connection with most intercommunicating telephone systems it is necessary to make, at frequent intervals, splices for intermediate distribution, and also for testing purposes. To attain this end, splices of varying degrees of neatness are generally made, very few of which are accessible in case of trouble without a great deal of labor in unwrapping the tape with which they are covered.

A design for an eight-wire junction box for intercommunicating systems is herewith described with appended drawings, which is intended to meet every possible requirement of the user. It is compact, strong and easily accessible. To obtain the best structural efficiency, the woodwork should be oak, unless it is intended to match woodwork other than this. It is, of course, hard to work, but as it is not as susceptible to climatic changes as other woods it is well worth the extra labor occasioned by its use. The frame of the case should be constructed first. This consists of two pieces of oak 4¼" x ⅝" x 1" and two pieces 12¼" x ⅝" x 1". These are to be thoroughly planed and smoothed off and put together as shown in Fig. 1.

A good, solid piece of oak, free from knots and as level as

Fig. 17.

Fig. 18.

See Loading long distance lines for telephone service, page 79.

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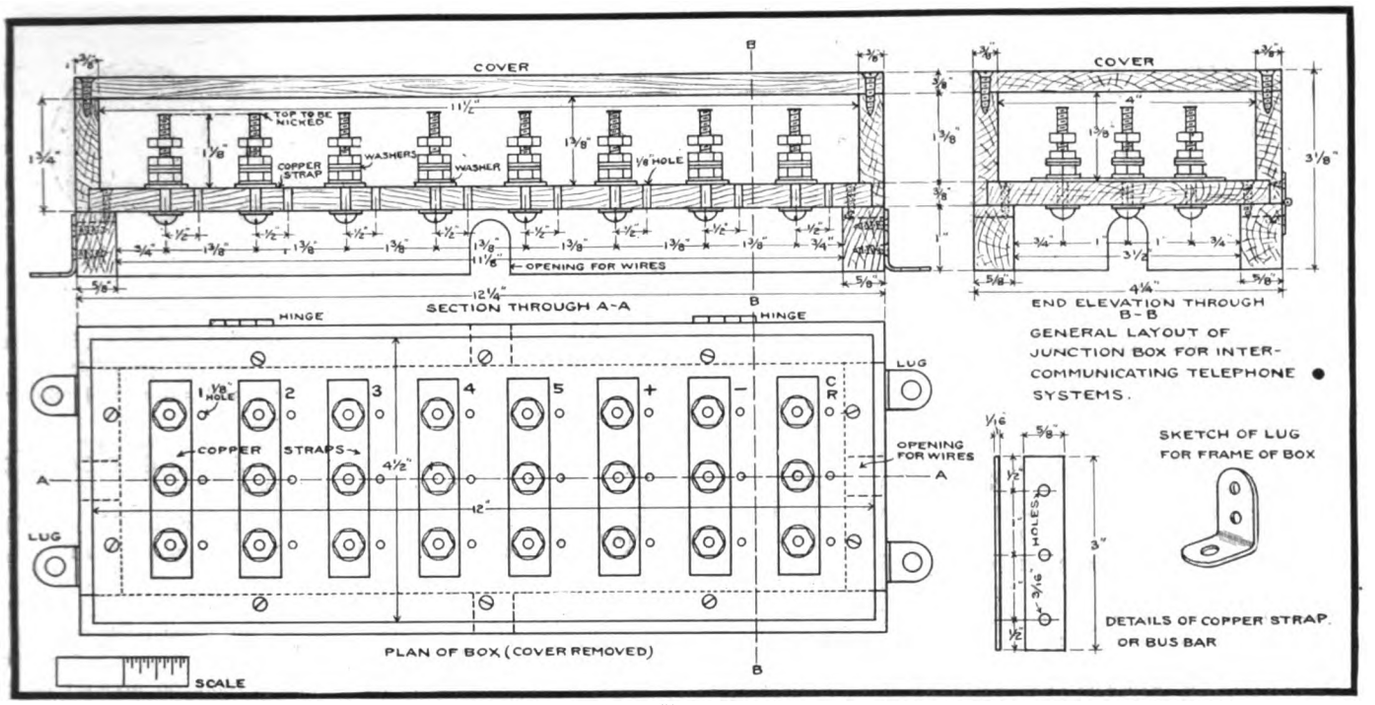

Fig. 1.

possible, should now be procured. This should be ⅜" thick, 4⅜" wide and 11⅞" long. Holes to accommodate the lock nut screws, etc., should be drilled as per dimension shown in the drawing; these should be at least 3-16" in diameter. Paralleling these holes, a second set is to be drilled to admit the incoming wires. This piece should now be screwed to the frame with several flat headed brass screws; it might not be superfluous to add, that, in putting screws in oak, a hole should be drilled to accommodate the screw as otherwise it is liable to split. The cover is composed of five pieces of oak; one 12¼" x 4¼", which is the top, two pieces 1⅜" x 12¼" and two pieces 1⅜" x 4", which are the sides and ends, respectively. Each piece should be neatly planed and smoothed off before putting together, which should be done with several small brass screws.

These two parts of the box being now complete, the cover

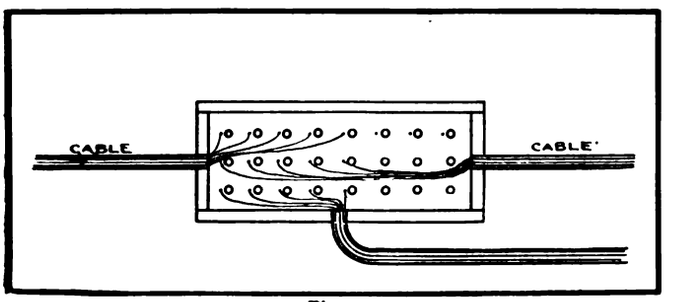

Fig. 2.

should be attached; it should be perfectly flush with the surface of the frame. Two hinges, preferably of brass, are to be attached to the cover and frame as indicated in Fig. 1.

To facilitate the attachment of the junction box to the wall, it should be fitted with 4 galvanized iron or brass lugs which are to be attached to the box as indicated. These may be made as follows: procure a strip of iron or brass, as desired, 1-16" thick, about ⅝" wide and about 15" long. With a hacksaw cut neatly enamelled or painted or finished to suit the taste of the corners. If a machine drill is available, take the 4 pieces, clamp them together and drill 3 holes about 3-16" in diameter, and in the center; this is shown in the detail sketch in Fig. 1.

Take these pieces and bend them at right angles, making the bend between ⅝" and ¾" on one end. They should then be neatly enamelled or painted or finished to suit the taste of the constructor. Secure these to the box with small brass screws.

The connecting straps, or bus bars, are now to be made. Eight strips of copper or brass, preferably the former, are to be cut 1-16" thick, ⅝" wide and 3" long. Three holes 3-16" in diameter are to be drilled 1" apart and ½" from the ends and in the center of the strip; they should be neatly filed off, if necessary, and finished with fine sand or emery paper.

Brass nuts, screws and washers are to be provided, the dimension of which are not given in the drawing, they being of standard size, similar to those used in most terminal boxes. Take the lugs or bus bars, as they might be termed, and attach them to the base provided for them with the nuts and screws above mentioned; the nuts should be tightened thoroughly. Now put the rest of the nuts and washers on, in the order indicated; when all are in place, the ends of the screws should be nicked with a chisel to prevent the nuts coming off.

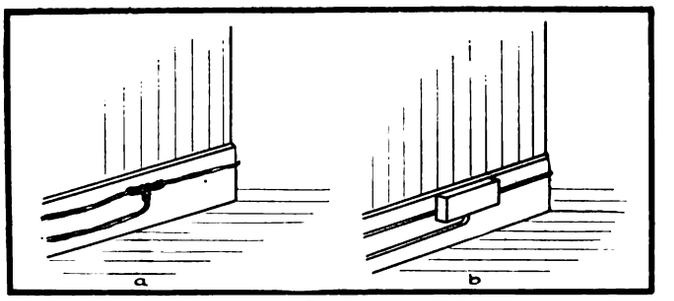

Fig. 3.

The junction box is now practically complete with the exception of cutting openings in the sides and ends of the box to accommodate the incoming wires or cables, as the case may be. These may conveniently be cut with a fret saw.

Before attaching to the wall, the cables or bunch of wires, as the case may be, should be brought in through the openings provided for them in the lower part of the box and the end of each wire that is to enter should be scraped free of its insulation for about one inch and brought in from the back through the small holes provided for it. A diagram, Fig. 2, shows the general arrangement of the wiring, the cables entering the box and being terminated thereat.

The advantages to be derived from this junction box over the ordinary type of splice are at once manifest and manifold. A drawing, Fig. 3, illustrates the difference in the appearance of the two and indicates the mechanical superiority of this device.

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IN THE OPERATING FIELD

COMPETITION TO REDUCE RATES PROMISED IN VANCOUVER, B. C.

THE British Columbia Telephone Co. is planning to furnish measured telephone service for the city of Vancouver at $1 per month, against the $50 for business and $25 for residence charged by the Bell Co. Negotiations are now being entered into between the company and the city council, and if satisfactory arrangements can be made, the new system will be installed this year. At this rate only a limited number of calls can be made during a day, but the extra charge per call will be correspondingly low, and after the average fee has amounted to more than $1.50 per day rebates will be given.

CREDITABLE FINANCIAL REPORT OF MONMOUTH, ILL., INDEPENDENT SYSTEM.

THE financial statement of the Monmouth, Ill., Independent telephone company, which has just been issued, shows a very creditable financial year. In addition to paying in full the current expenses of the year, the company has paid interest on bonds amounting to $1,482, and has created a sinking fund for the redemption of the bonds, in which has been deposited $948.48, out of which, six treasury bonds have been redeemed and cancelled.

RECEIPTS.	
From rent of telephones	$12,130.91
From toll charges	2,040.05
From miscellaneous charges	217.19
Total receipts to July 1, 1905	$14,388.15
Cash on hand July 1, 1904	22.46
Balance	$14,410.61
EXPENDITURES.	
Salaries	$5,461.39
Heat, Light, Rent, etc.	808.47
Taxes	264.37
Repairs	747.95
Total for operating expenses	$7,282.18
Interest paid on bonds	$7,282.18
Interest on Note	11.13
Sinking fund	948.43
Extensions (new apparatus)	2,997.24
Total expenditures	$14,221.03
Cash on hand July 1, 1905	189.58
Balance	$14,410.61

The above report shows a gain of $1,778.50 in the amount of receipts over those of last year, or a gain of $1,376.51, equal to 16½ per cent. in the rent receipts and a gain of $358.05 in the toll receipts. eqnal to 21¼ per cent.

A toll line is being built to Burlington which will be complete by the last of the summer. Last year 998 telephones were being operated. This year 1,181 are in operation, net gain of 183, 166 in the city and 17 in the country. There are 877 subscribers in the city, 188 of these being in offices and stores and 689 residences. There are 304 country subscribers.

IOWA INDEPENDENT COMPANIES TO GET CONNECTION WITH NEBRASKA.

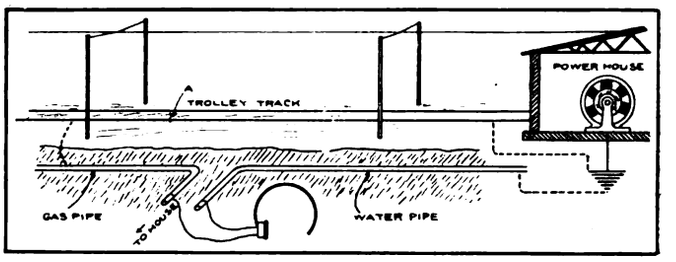
WHEN the Independent telephone system in Council Bluffs is completed the Independent companies will secure connection from Iowa to Nebraska which will allow them to compete on heretofore Bell territory.

The Iowa lines have been built within a few miles of Council Bluffs, but there they were forced to stop, and no interstate connections with Nebraska have been possible on account of this seemingly insignificant gap.

AN ORIGINAL TROLLEY CAR DETECTOR.

By Leo S. Herzog.

WHILE making a test in the suburbs of New York to see whether there was a perfect ground between gas and water pipes, I discovered that a current of electricity flowed between them. On further investigation, I found by placing a voltmeter across the pipes a potential difference of about 2½ volts. An ammeter showed the current varied from ½ up to 7 or 8 amperes on short circuit. While working



Receiver employed to test for locating of trolley cars.

with two telephone receivers, using each as a transmitter and receiver, I noticed that I could distinctly hear what appeared to be the armature of a motor rotating. After waiting a while I again could hear what appeared to be another motor, which from a feeble rotation became very distinct, and then gradually nearly died out. After another lapse the same thing happened and I deduced that earth leakage trolley currents caused the noise. From these results, I devised a novel but useful piece of apparatus. On occasions, when time was valuable or weather severe, I simply placed a receiver to my head, and listened till I heard the noise of the motor. As I became quite skillful in distinguishing the distance of the car from my house, I was able to allow myself just sufficient time to walk to the car. There

CONTRIBUTIONS SOLICITED

THE AMERICAN TELEPHONE JOURNAL is always in the market for crisp, snappy news or technical contributions. Descriptions of ways to do things telephonic, illustrated with sketches, and also descriptions accompanied by photographs are especially acceptable and will be paid for. Literary skill is not essential, but is, of course, appreciated. Send your sketch, photographs, and write the matter as well as you can. It will be dressed up, if necessary. Here is an opportunity for telephone men from engineers down to ground men to increase their incomes. An article cannot be too technical nor too elementary for us to consider. Articles illustrated with photographs are particularly desirable and will be substantially acknowledged.

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might be trouble in determining whether the car was going north or south, but fortune was in my favor; as I rarely had occasion to go north, and often to go south. It happened that this leakage existed on the south-bound track alone. On the north-bound track there was no leakage; therefore, I could tell nothing of the movements of north-bound cars. In addition to this contrivance I used the current, which cost me nothing, to run a bell system, a telephone system, a medical induction coil, a wheatstone bridge, and for various experimental purposes.

UNITED TEL. AND TEL. CO. TO EXTEND ITS LONG DISTANCE SYSTEM.

THE United Telephone and Telegraph Company, of Philadelphia, has sold to H. P. Taylor & Co., of Pittsburg, $500,000 first mortgage 5 per cent. 30-year gold bonds, of which $250,000 are bonds of that company and $250,000 bonds of the Cumberland Valley Telephone Company, principal and interest guaranteed by the United Telephone and Telegraph Company. The price paid for these bonds is said to have been at a considerable advance over the prices at which these securities previously sold.

It is the intention of the United Telephone and Telegraph Company to greatly increase the long-distance service between Pittsburg and Philadelphia, and to which the proceeds of the sale of these bonds will be devoted. It realizes that an immense amount of business has been lost heretofore on account of its limited capacity in that direction. It is estimated that by increasing its long-distance facilities the net receipts of the company can be increased not less than fifty per cent.

FORMATION OF THE INDIANA INDEPENDENT TEL. ASSOCIATION.

A VERY important meeting of Independent telephone men, representing upwards of 40,000 telephones, was held at Winona, Indiana, on the 12th inst. The result of this meeting was the formation of the "Indiana Independent Telephone Association." It is patterned after the Ohio idea, and consists of the Indiana Mutual and the Southern Indiana Telephone Associations. About seventy-five telephone men attended the meeting.

In calling the meeting to order, Theodore Thorward, president of the Indiana Mutual Telephone Association, said that the object of the meeting was for a general consultation of the conditions that confront Independent telephony in Indiana; and also to devise ways and means best calculated to protect the Independent properties against the new plan of attack by the Bell. He suggested the formation of a financial institution to look after small or struggling companies, and also a systematic advertising bureau.

Mr. Thorward's address and recommendations were well received, and on motion a committee on organization, headed by Charles S. Norton, of Indianapolis, was appointed to present a plan and articles of association for a new organization.

The plan recommended by the committee of the state association, provided for the formation of district organizations, which are to be represented by delegates. The state is divided into eleven districts. Each district president will be a vice-president in the state organization. The committee's report was adopted and the following officers elected: President, George W. Beers, of Fort Wayne; secretary-treasurer, Charles S. Norton, of Indianapolis. Vice-presidents: First district, Theodore Thorward, South Bend; second district, W. L. Moellering, Fort Wayne; third district, Walter J. Uhl, Logansport; fourth district, Oliver P. Freiberg, Lafayette; fifth district, T. A. Bromley, Jr., Muncie; sixth district, C. R. Duffin, Terre Haute; seventh district, W. W. Mendenhall, Indianapolis; eighth district, A. C. Lindermuth, Richmond; ninth district, W. C. Curil, Petersburg; tenth district, C. K. Knoefel, New Albany; eleventh district, W. R. Swarthout, Rising Sun. Mr. Beers thanked the members present, and said he felt honored and would do everything possible to make the association a success, Thereupon he appointed the following executive committee: A. Z. Fanzen, Terre Haute; Theodore Thorward, South Bend; A. C. Lindermuth, Richmond; O. P. Freiberg, Lafayette; Jas. W. Weik, Green Castle.

The subsequent discussions included a wide range of subjects. C. S. Norton, of the New Long Distance Company, said that Independent telephony was never so prosperous in Indiana as at present. He pointed out that if the Bell company doubled its capital and its lines, it would then only be one-half as strong as the Independents are now. President Beers recalled the suggestions made by the National Interstate Telephone Association regarding standardization, uniform toll signs and a uniform system of accounting, and made some timely suggestions for future action.

J. B. Hoge, president of the National Interstate Association, addressed the meeting, and congratulated the Indiana telephone men on the step taken to consolidate all the organizations for the betterment of Independent telephony in Indiana. He said he was pleased to notice the harmony and enthusiasm existing among the aggressive Indiana telephone men, and in his opinion the work of the convention was one of the strongest moves yet made by the Independent telephone men in the state. Mr. Hoge's talk was well received and he received a vote of thanks for his attendance and good counsel.

At the close of the meeting the delegates became the guests of Mr. J. M. Scott, the general manager of the Warsaw Commercial Telephone Company, who took them across the lake for a boat ride.

BULLETIN NO. ONE ISSUED BY THE NATIONAL-INTERSTATE TELEPHONE ASSOCIATION.

OFFICE.—The association has established general headquarters and opened an office at 708 Electric building, Cleveland, O., where Mr. John A. Harney, the assistant secretary, can be found at all times. Files have been secured with a view of gathering complete information on the telephone situation of the United States.

INFORMATION WANTED AT ONCE FROM STATE ASSOCIATIONS.—1. Line and circuit maps of all important toll lines in the different States for the purpose of making up one good map of the Independent development of the United States which can be published for general use.

2. Statistics as to the number of circuit miles of toll line, number of subscribers, number of exchanges and number of stockholders of the Independent companies in each State.

ASSESSMENT NO. 1.—The Executive Council at its meeting in Chicago authorized the treasurer to issue a call for an assessment of one cent per unit for the purpose of putting the association on a substantial working basis. The notices for this assessment have been sent out to the various State associations under date of July 10.

INQUIRIES, TOLL SIGNS, DIRECTORY COVERS, STATIONERY, CUTS, ETC.—Almost every mail since the convention has brought inquiries from all parts of the country for prices on standard toll signs, stationery and other supplies bearing the official shield adopted at Chicago. At the request of a number of Independent people, in order to have the shield generally adopted throughout the country as soon as possible, and to enable all the Independent companies to secure toll signs, stationery, etc., bearing the official shield at reasonable prices, arrangements have been made whereby especially low prices can be secured on toll signs, directory covers, letter heads, envelopes and business cards. In order to get these low prices and make it possible to have the standard emblem adopted quickly and at the same time cheaply, it will be necessary to have the support and co-operation of the various Independent companies. Price lists will be ready about August 1 and will be forwarded to any one interested. Address all inquiries to J. A. Harney, assistant secretary, 708 Electric building, Cleveland, O.

MONTHLY BULLETINS.—Bulletins similar in character to the foregoing will be issued monthly for publication in THE AMERICAN TELEPHONE JOURNAL.

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WHAT IS MISSING IN TELEPHONE TRANSMISSION.

THE physicist takes the scientific view, the merchant or manufacturer the commercial view of those devices which collectively constitute the items of twentieth century advancement. Of all items, those which are specified as belonging to the limited category of signaling or speaking systems, occupy the front rank. The telegraph passed through its initial stages and finally emerged from the crucible of experimentation, with enlarged scope and an established field of usefulness. The transition from a single message system to a diplex, duplex, quadruplex and multiplex system left little to be desired. It was not until the Hertzian waves were projected across the ocean's depths that a thrill passed through the world again. A new epoch was marked in the history of telegraphy. In similar respects, the telephone has gained headway by leaps and bounds. The chasms of difficult attainment have been bridged, and now we are prepared to listen to the physicist, and hear what he has to say about that which is missing in telephony.

It must be understood that the mere vibration of a diaphragm by air waves does not mean either good or coherent speech. When the voice is directed against the mouthpiece, a torrent of waves strikes the diaphragm. It is composed of tidal waves and delicate ripples, some as faint and elusive as a summer zephyr. Their energy is imparted to a common medium which aids in ultimately transforming them into equivalent electrical waves. The difficulty is not in taking care of those particular air waves which leave a definite impression upon the diaphragm. It is emphatically that of recording the impressions of the more delicate vibrations. No electrical change is too fine to affect a receiver.

It is not in the strictly electrical end of the process that something is lacking; it is in the means employed of gathering up all the voice tones and their components. In orchestral music, our ear receives the general blend of sound as a single chord. If an orchestra of 1,000 players produced a chord, which when received by an appropriate device could be analyzed, and each individual instrument faithfully recorded; a case similar in kind though not in degree to a transmitter would be presented. The immense variety of sounds projected into the transmitter and the small number received constitute its greatest defect. Much of the personality of the voice, its characteristics, its full orchestral effect, are lacking in telephonic speech. The difficulty is an acoustic and not an electrical one. What we miss in telephony has been correctly termed by the physicist, the overtones. They will never be preserved, unless the diaphragm receiving them, is capable of embracing all their true differences; whatever we miss in telephony may ultimately become in this respect its only unsolved problem.

AN EXAMPLE IN TELEPHONY FOR AMERICANS.

NATURAL pride may temporarily override natural deficiencies, but it cannot long ignore the truth. The truth in this instance is such, that we are forced to admit, that in spite of our millions of dollars in invested capital, the best equipped city in the world telephonically is not New York, Chicago or Philadelphia; or even London, Berlin or Paris, but Stockholm, Sweden. It is here, we may find an object lesson in the use of the telephone. It is customary for us to regard Europeans as ultra conservative in their attitude to large schemes of national or local importance. But evidence can be readily produced, tending to show that such assertions are too sweeping in character to be strictly correct. The fact of the matter is, that the European attitude as exemplified in the case of the city of Stockholm, is to engage in a radical proposition, only after healthy deliberation; and then to execute the work with thoroughness.

A great problem cannot be digested too quickly. The details in such a case are bound to suffer, and the crystallization of the plan as far as its ultimate perfection is concerned, becomes a slow process. We are, to a large extent, thus situated in the United States. It would be unwise to speculate upon the value of a system with the government behind it, as in the Swedish city, mentioned; but it is not unwise to note the fidelity with which the possibilities of the telephone are developed. These possibilities may be interpreted entirely as widespread applications. The government owns the telephone system and leases telephones to the public at low rates. Every place of public amusement, the street corners, the cab stands, the restaurants and hotels, all speak of the spirit of advancement in this respect. On all sides are seen the glass booths, with telephones opened automatically by a small coin, and ready for service morning, noon or night.

When the busy tinkle of the telephone is heard in the crowded business districts of large cities, we are led to believe we are in touch with the greatest of inventions. But it must not be forgotten that it is not as yet a public utility in the full sense of the word. The telephone is not synonomous with gas or coal. It has not as yet achieved that success which merits for it the title of indispensability. The mills of the gods grind slowly, yet it is well to remember, that to no city, more than an American one, belongs the tradition that "it is the most telephoned city in the world." The mills of the gods therefore grind too slowly, when we must look to a city just below the circle of perpetual snow whose intelligence and enterprise mark it out as the standard in the field of practical telephony. When every humble wage earner of our great American cities, finds it possible to have a telephone, we may only then wrest the title from Stockholm, that it is "the most telephoned city in the world."

A CASE OF ATAVISM.

IN Berlin the telephone company has a switchboard which appears to be a reversion to a type so old as to be almost unfamiliar to telephonists of to-day. The board might be said to consist of a long flat-top table, in which jacks are inserted horizontally. The signals are placed along the edge of the board, and the operators' plugs suspended in a rack in front of the signals. With this form of board, two sets of operators can be employed, one on either side of the board. In order to complete a connection, the operator must reach across the table and insert the plug. In America this form of board was a familiar type in the old days of the Law company, and where it became a favorite with many telephone engineers. The vertical type has, so far as this country is concerned, entirely displaced it. Apparently, experience has indicated that much trouble has been had with the horizontal board, owing to the inevitable collection of dust in the interstices of the jacks, which in the vertical type is very largely avoided. It will be interesting to note whether this return to a former design will be found successful.

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As to Cost of Amsterdam Plant

EDITOR'S NOTE.

The article published in our issue of June 17, relating to the construction of the Amsterdam, N. Y., plant built by LeRoy W. Stanton, has aroused a great deal of controversy among engineers. It has been freely asserted that the figures given by Mr. Stanton, $42.50 per station, do not represent the true cost at Amsterdam, and that, moreover, such figures are impossible.

As Mr. Stanton, in the face of this criticism, stands by his guns, it has been deemed advisable by this paper, to get an outside point of view. Accordingly, the Editor requested Mr. Frank B. Hall, of Wheeling, West Va., one of the best known consulting telephone engineers in the world, to go to Amsterdam, and the result of Mr. Hall's observations are furnished below.

Wheeling, W. Va., July 7, 1905.

AMERICAN TELEPHONE JOURNAL, New York.

Gentlemen:—As requested by your Mr. McDonough, at the Telephone convention at Chicago, I have visited Amsterdam, N. Y., and investigated the telephone plant installed there under the supervision of Mr. L. W. Stanton, of Cleveland. The following is my opinion:

The plant consists of a small conduit installation of about 6,000 duct feet with 7 manholes; a multiple tap cable installation of 114,500 ft., with aerial cable of the following sizes: 10, 15, 25, 50, 100, 140, 200 and 240 pairs; and 380 pairs underground cable. The cables are No. 22 B. & S. gauge, double wrapped dry paper, lead encased. There are 1,040 pairs installed, not including 16 pairs for toll lines. The work has been done in the cheapest manner possible. Eighty per cent. of the aerial cables are supported on No. 6 and No. 8 solid galvanized steel wire. The cables from 100 up to 240 pairs are supported on ⅜-inch ordinary steel strand, and the 380 pair cables on ½-inch ordinary steel strand. The usual practice is to support cables on poles on S. M. or high strength steel strand. The poles which have been set are small in size, and are not suited for cable work. For the reconstruction work the following number and sizes of poles were set: One hundred and ninety-one 30-ft., one hundred and ninety-six 35 ft., fifty-five 40-ft., three 45-ft., and seven 50-ft. poles, a total of 452 poles sufficient to support about one-third of the aerial cable strung. To support the balance, old poles and poles that are used jointly by the telephone, the electric light, and street railway companies were utilized. The streets are full of angles, and there are many corners on the cable leads and many dead ending points; yet I only found three anchors set for the purpose of holding the strain. The guys used, in most cases, were No. 8 steel wire, and were attached to trees, poles or anything that would answer the purpose.

Mr. Stanton, in his published statement, leads the public to believe that this is a new plant, and that it has been constructed at a remarkably low cost. He says nothing about attaching cables to more than 800 poles which he did not set. I have never seen a poorer constructed piece of telephone work, and think it dear at any price. The company claims to have in use 700 telephones, which I think is very nearly correct, as its directory, distributed about June 16, contain 579 names.

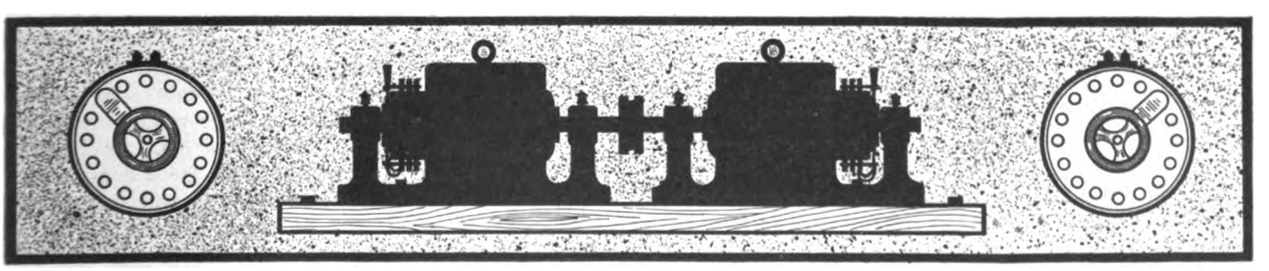
As near as I was able to determine, the plant has cost about $73,700, up to date, of which the underground work and wire plant cost about $34,000 for 1,040 pairs, an average of $34 per pair, which is enough for work far superior to that which has been done at Amsterdam. The practice of installing aerial cables of such large pair capacity is not standard. There are only three cables of 380 pairs each; these cables are in the following lengths with their branches: 28,000-ft., 56,200-ft., and 30,000-ft., respectively. They are tapped out at 378 points, an average of 126 taps to each. Should this distribution work out correctly with 20 per cent. of conductors not available, 30 per cent. for single line subscribers and 50 per cent. for four party subscribers, the exchange should have, when the cable plant is worked up to its full capacity, about 800 subscribers to each cable, rather a large number of eggs to place in one basket.

Referring again to the cost of this plant, as reported by Mr. Stanton, I cannot see where he is justified in making the statements he has. The cost of $73,700 for present equipment, plus $19,500 to cover the expense of installing the additional 1,300 telephones to bring the plant up to 2,000 telephones, would make a total of $93,200, or about $90 per equipped line. This does not make any allowance for old pole line utilized to support present cable installation.

I have endeavored to get the facts in the case as correctly as possible, not having had access to the books of the company. I went over the entire work, entered up the quantities of cable on a scaled map, counted the poles set and taps cut in the different cables.

Hoping the above information will fully cover your requirements, I am, Yours respectfully,

FRANK B. HALL.



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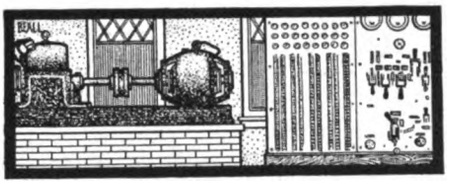

QUERIES

Questions on any subject relating to telephony will be answered on this page.

CABLE TROUBLE CAUSED BY ICE.—(583.)

Last year our company constructed some underground work on Long Island. The cables ran up the distributing poles in pipes. Through negligence one of the pipes was not covered, so that it became filled with rain water. The water froze and, expanding, squeezed the cable until the wires in it were short-circuited. Similar occurrences were prevented at other points throughout the system by capping the pipes. A great quantity of cable was placed in a pretty deep trench, with no other covering than a board on top of it. Now, assuming that cable be laid in the ground without any pipe or conduit, at say a foot from the surface, would there not be some danger in heavy freezing weather that the cable would be squeezed by the freezing ground in the same manner as in the pipes? Have you ever heard of such a case? Freezing water will unquestionably do it,

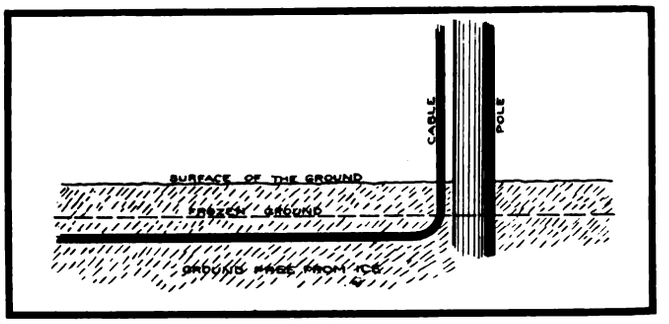

Fig. 583A.

but is the ground so porous that it is safe, so far as freezing is concerned, to lay a cable underground without other protection than a board on top of it; or is it essential that the cable should be protected from the squeezing process due to the freezing of the ground? M. D. F.

IT is difficult to state precisely what would happen under the conditions specified, but it is pretty safe to say that a cable laid in the ground, in a horizontal position, either above or below the frost line, would not be injured in cold weather. Cables have often been forced out flat by being hammered, or by having reels roll over them, without causing any trouble. Again, a cable sheath is a cylinder and will stand an enormous external pressure, without collapsing, provided the pressure is applied uniformly around its circumference. It would seem, therefore, that the pressure caused by freezing ground should not affect one.

The point where the trouble is apt to occur is that where the cable passes the frost line. One pair lead cables have been found severed at the bases of poles, at the frost line. At this point the cable often changes its direction from a horizontal to a ver-

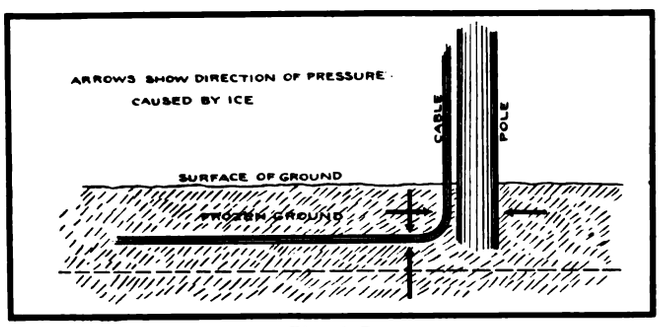

Fig. 583B.

tical one, and while one portion is strongly contracted by the frozen ground, the other remains normal. This has a tendency to break the paper covering of the conductors, thus allowing the wires to press against each other. (See diagram 583A.)

The same result would occur if a cable was laid entirely within the frost line, and changed its plane from a horizontal to a vertical one. The forces would act at right angles to each other, and buckle the wires and paper at the bend, as per diagram 583B. When a cable passes through an iron pipe in which a large amount of water has accumulated, the result would be intensified at the bend of the pipe. Affected cables that have been removed from iron pipes have, in some instances, possessed a twist, similar to a helical curve. This was no doubt caused by the upward motion of the ice which, being retarded by friction against the sides of the pipe, caused its mass to revolve as it moved upward. Where this motion is opposite to the twist of the paper, insulation on the cable conductor might have a tendency to cause the latter to untwist and become bared. The conclusion is, that trouble usually occurs at the point where the cable changes its plane.

BEST WAY TO BRING IN GROUNDED LINE.—(584.)

What is the best way to bring in a single wire grounded party line on a metallic circuit as illustrated (Fig. 584). All telephones are wound to 1,600 ohms resistance. I know it is best to make it metallic but cannot afford it. F. J. M.

BRING the party line in on a single wire, grounded, and transpose the metallic circuit every quarter mile. Referring to Fig. 584 the first transposition should be one-eighth mile from *A* and the last one the same distance from *D*. *B* and *C* should be midway between transpositions. Another way is to phantom the metallic circuit between *A* and *D*, which would require a repeating coil at *A* and one at *D*. For this to be possible none of the metallic circuit telephones should have any ground

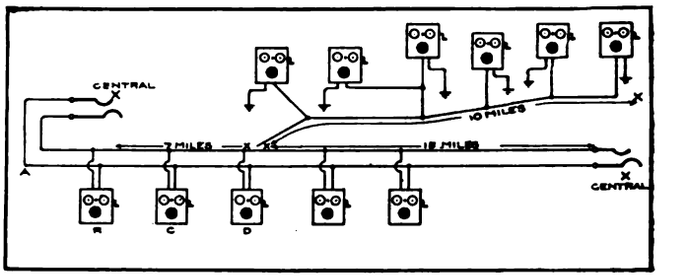

Fig. 584.

connection and the ringing generators in the exchange should not be grounded. A diagram of phantom circuits was shown in the query column of the JOURNAL of April 29 (Query No. 544). The latter solution is the cheapest if the above conditions can be met.

TESTING DRY CELLS.—(585.)

We use batteries to operate our switchboard. One battery gives 75 volts and only 4-5 amperes; the other battery gives 50 volts and 6 amperes. What is the matter with the 75-volt battery? I have 73 cells connected in my 75-volt battery, 60 of the cells are the sal ammoniac cells, and 13 are dry cells connected up in series, while the 50-volt battery has 42 dry cells connected in series. J. S. M.

YOUR 75-volt battery has in all probability one or more bad cells which act as a resistance to the flow of current. The best or safest way to test out the battery is to take each cell separate and close its circuit through about 6 ohms resistance for five minutes, taking a voltage reading at the beginning and at the end of this period with a high resistance 1.5 volts pressure, so that the current through the 6 ohms would be .25 of an ampere. The voltmeter readings will then be 1.5 at the beginning and at the end of the five minutes if the cells are fresh. However, all cells that do not show a drop of over 10 per cent should be all right. Old cells will not give much more than 1.2 volts on a closed circuit and all falling 10 per cent below this value after five minutes connections to the resistance should be discarded.

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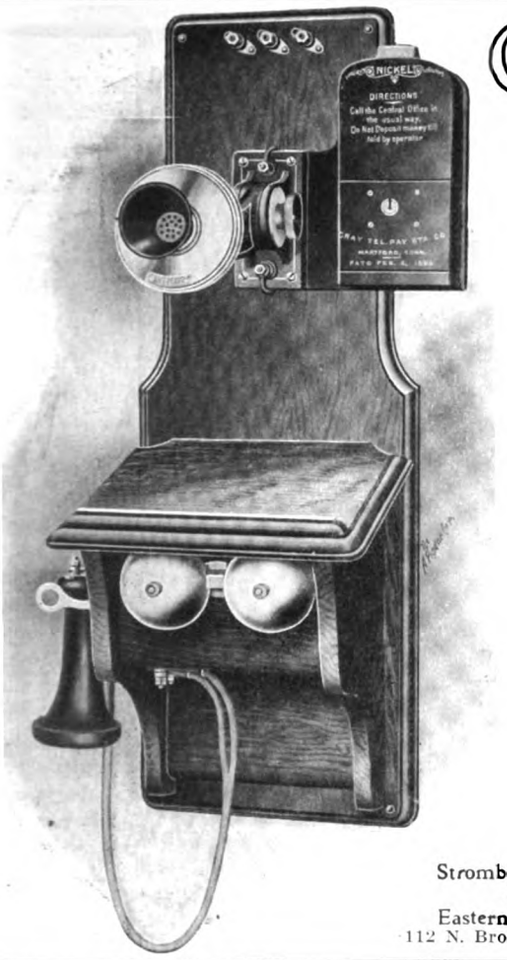

GRAY PAY STATIONS GRAY

SOMETHING TO REMEMBER

IT MAKES NO DIFFERENCE WHAT PAY STATION YOU NOW USE, OR HAVE USED, THE ONE YOU WILL EVENTUALLY BUY IS THE

GRAY

IT'S AUTOMATIC

GRAY TELEPHONE PAY STATION CO.

SEND FOR CATALOGUE HARTFORD, CONN.

SELLING AGENTS:

Stromberg-Carlson Tel. Mfg. Co.
Rochester, N. Y.

Geo. W. Conover
Suite 1112, 135 Adams St., Chicago, Ill.

Eastern Electrical Con. Co.
112 N. Broad St., Philadelphia, Pa.

Sterling Electric Co.
Lafayette, Ind.

FOR SALE

Advertisements under this head, $1.00 for 25 words or less for each insertion. Prepaid.

FOR SALE, CHEAP—600 pairs Kaisling self-soldering protectors. Also one 300 pair and one 500 pair American main distributing frame, used less than two months. Will sell separately or together. Address Virden Telephone Exchange, Virden, Ill., or Girard Telephone Exchange, Girard, Ill. 420

FOR SALE—At half cost, 50 series telephones, oak, H—C ringers. Ericsson transmitters, good as new. Replaced by party-line instruments. Address Rock County Telephone Company, Janesville, Wis. 404

FOR SALE—Two-fifths (2-5) interest in good paying telephone plant west of Missouri River. Position of manager goes with sale. Ten thousand dollars ($10,000) to hand deal. Address Box 405, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 405

FOR SALE—Four sections Western construction express switchboards, 100 metallic lines each, 80 ohm series, cheap. Address Maysville Telephone Company, Maysville, Ky. 421

FOR SALE—Four telephone exchanges and one electric light plant, all on paying basis and in first-class condition. Prices from $1,500 to $40,000. No competition. Write for particulars. Piedmont Electric Company, Anderson, South Carolina. 413

FOR SALE—Three sections Kellogg switchboard, 150 drops each, 350 magneto telephones, 6 American terminal heads and protectors: good and cheap. Address H. B. Smith, Ashland, Ky. 422

WANTED

Advertisements under this head 25 cents for 25 words or less for each insertion. Set in bold face type $1.00 per insertion for 25 words or less.

WANTED—Three expert solicitors; must be thoroughly competent to go after the hardest kind of business. About four months' work, and for the right men salary is no object. Address Box 406, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 406

WANTED—Position as electrician or superintendent with Independent company. Seven years' experience in factory and exchange work. References furnished. Address, Ed. A. Peters, Tell, Wisconsin. 418

WANTED—A first-class man to take the position of general manager of an Independent telephone company in a city of 60,000 people. No one need apply nor respond to this advertisement unless he is thoroughly reliable, sober and thoroughly up in his business and can give first-class recommendations. Direct all answers to D. L. Hall, 355 Dearborn street, Chicago, Ill. 415

WANTED—First-class, experienced man as switchboard man and wire chief for 600 subscriber centralized call exchange. Must be competent to take charge of mechanical operation of exchange. Good salary for the right man of good habits. State age, experience and give references. Address Cairo Telephone Company, Cairo, Ill. 416

POSITION WANTED—A first-class construction man having 13 years' experience in telephone work desires connection with a telephone company in its construction department. Will be at liberty August 13. Address Telephone Engineer, 411 So. High street, Belleville, Ill. 419

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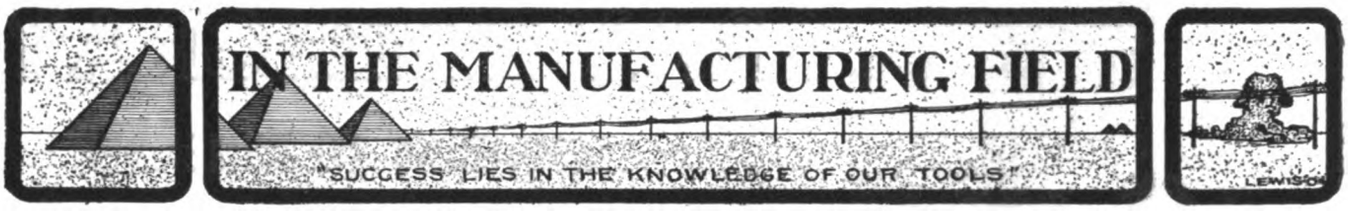
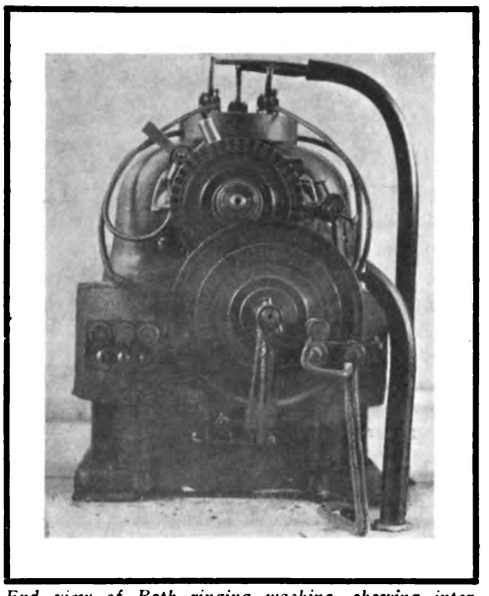


ROTH POWER APPARATUS.

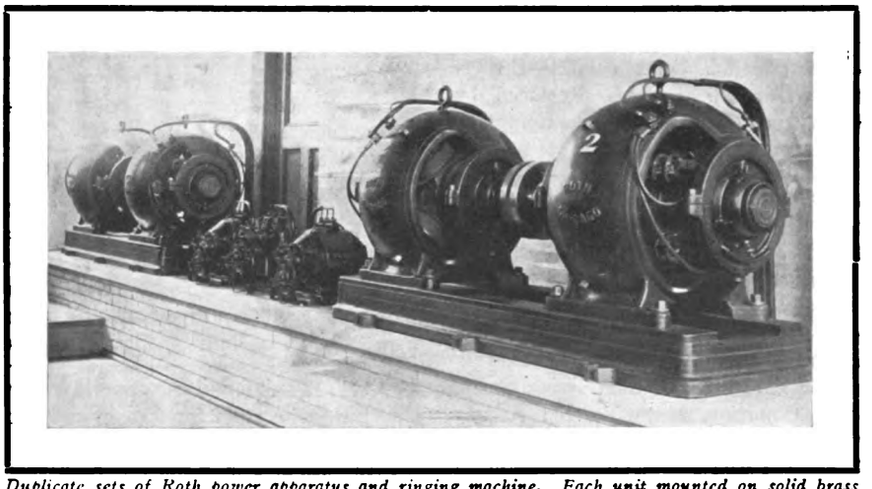
NOT the least important part of an exchange equipment is the power apparatus. In fact, there is no item of the equipment which requires more attention to details in design, than this apparatus. Motors and generators for telephone service must not only be designed along the most improved lines of general practice, but, must as well, be proportioned and built with a view toward their application to telephone uses. This necessitates a thorough understanding of the principles which underlie telephone engineering in respect to the supply of current for power, transmission, and ringing purposes. Roth Bros. & Co., Inc., 27-29 S. Clinton street, Chicago, Ill., is turning out a line of this class of apparatus which it claims meets all requirements. The accompanying illustrations show an end view of one type of its ringing machines, with interrupters for tone test, busy and trouble signals; and also a picture of a set of its combined motors and generators. In operation this apparatus runs smoothly and evenly and is designed to withstand hard usage with the minimum attention and without overheating. The generators are direct driven from the motors by means of an insulated coupling which effectually prevents short circuits or leakage of current from one machine to the other.



End view of Roth ringing machine, showing interrupters for test purposes.

THE S. H. COUCH CO., INC., 156 Pearl street, Boston, Mass., utilized a mailing card as an advertising novelty at its booth at the Electrical Contractors Convention and Exhibition in Boston. The card, on the reverse side, was illustrated with two pictures of the firm's automatic intercommunicating telephones and drew attention to the fact that Boston is noted for three things, viz: Beans, Brains and Couch Telephones. These cards were in great demand by visitors to the Couch exhibit.

THE CENTURY TELEPHONE CONSTRUCTION CO., of Buffalo, N. Y., manufacturers of the platinum electrode transmitter claims for it a complete absence of side tone, packing; and permanent adjustment. The side tone it says is overcome by the peculiar manner of dampening the discharge at the particularly vulnerable points, in such a manner as to throw all of the vibratory waves, caused by the voice, directly into the granular button, allowing no discord or inharmonious noise caused by the metallic ringing of the edges of the diaphragm, to go out upon the line. The manufacturers draw attention to the fact, that platinum is a metal upon which the arcing of a delicate electric current has no effect. The packing in the transmitter, commonly caused by the carbon electrodes being worn away, or cut down, by the action of the minute arc that takes place during the vibration of the carbon granules against the electrode during transmission of speech, is said to be overcome by the substitution of platinum face plates for the carbon electrodes. Inasmuch as the platinum is comparatively invulnerable to the action of the arcing, no cutting or wearing away process ensues, and no packing takes place.



Duplicate sets of Roth power apparatus and ringing machine. Each unit mounted on solid brass plate. Generators direct driven from motors.

THE DEAN ELECTRIC COMPANY, of Elyria, Ohio, is making an extensive addition to its factory and equipment in order to insure prompt delivery of its telephone apparatus. The working floor space is being more than doubled, and the equipment and working force will be increased in the same ratio. The Dean Electric Company commenced the actual manufacture of telephone equipment less than a year ago, and has already been forced to make one substantial addition to its factory. Its sales of common battery multiple switchboards and telephones, both common battery and local battery, have been very large. Its new selective party line equipment has been a big drawing card and is in great demand. Not only have all its new common battery switchboards been ordered with a full equipment of this party line system, but it has been installed in many exchanges using switchboards of other makes. The new express type switchboard which has just been placed on the market, is meeting with so much favor that increased facilities for its manufacture are also being provided.

This company has issued several booklets dealing with its apparatus which it will mail upon request.

THE HALLETT UNIVERSAL IRON.

THE Hallett Iron Works, of 92-96 West Polk street, Chicago, Ill., manufacturers of telephone construction material and tools, calls attention to its Universal Iron with corner brackets and bolts situated on one side.

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LE ROY W. STANTON

Consulting and Constructing Telephone Engineer

ELECTRIC BUILDING
CLEVELAND, OHIO

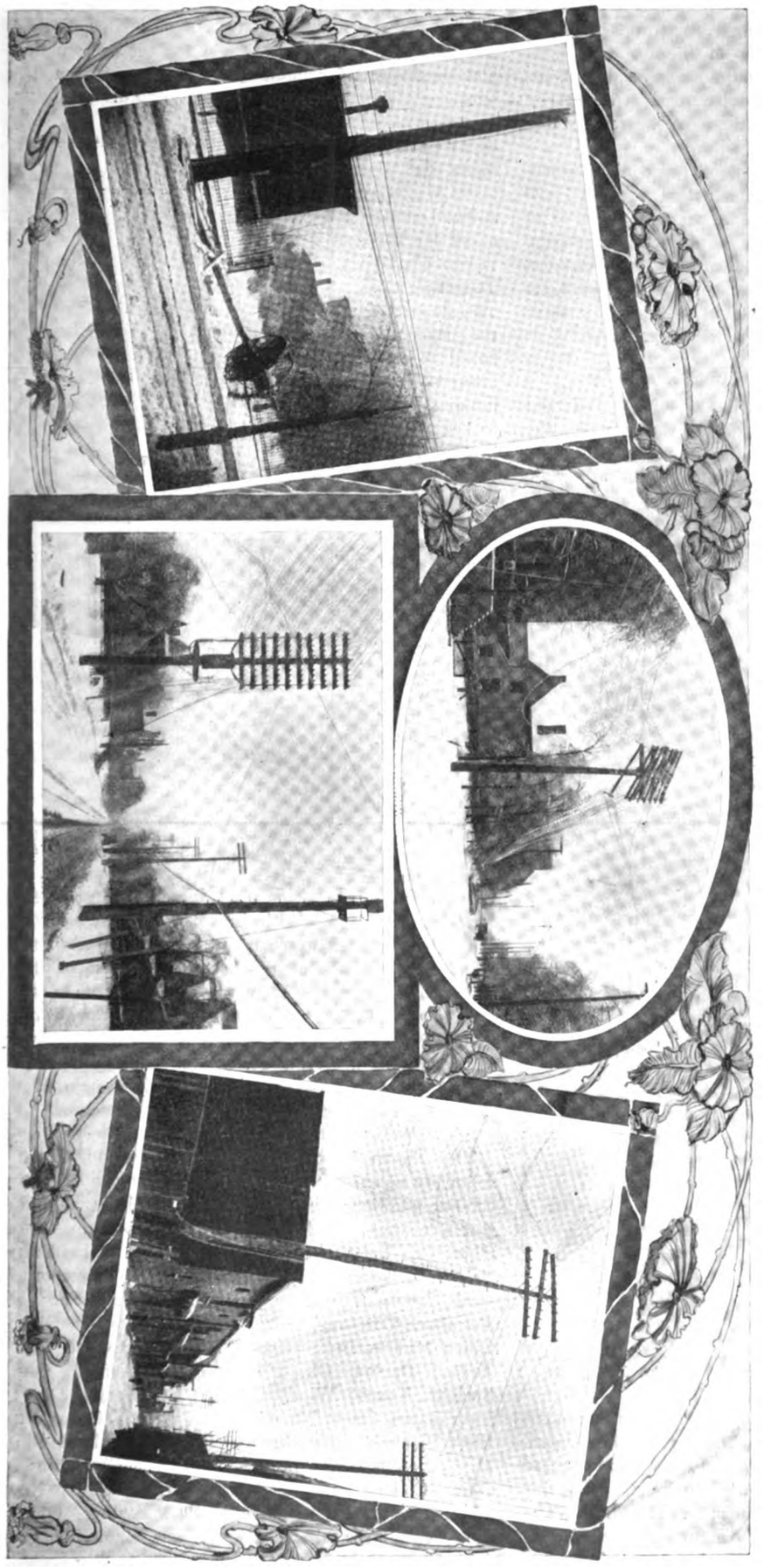
1644 Monadnock Building, Chicago, Illinois

Views of the Fearful Havoc of a Sleet Storm

Terrible Devastation by Nature's Elements, Tens of Thousands of Dollars' Worth of Property Destroyed in a brief space of Time

DIVIDENDS WIPED OUT FOR YEARS TO COME

Why not use **The Stanton Open Wireless or All-Cable System,** which is immune from sleet storms? When properly planned and constructed it is cheaper in first cost, far cheaper to maintain, enables you to give better service, costs less for depreciation, and insures greater and regular dividends.



POLES BROKEN AND WIRES DOWN AS FAR AS THE EYE CAN SEE.

Insure your properties against heavy loss by having L. W. Stanton, the Consulting and Constructing Telephone Engineer, of Cleveland and Chicago, place your wires under ground, in accordance with the latest and most approved engineering practice.

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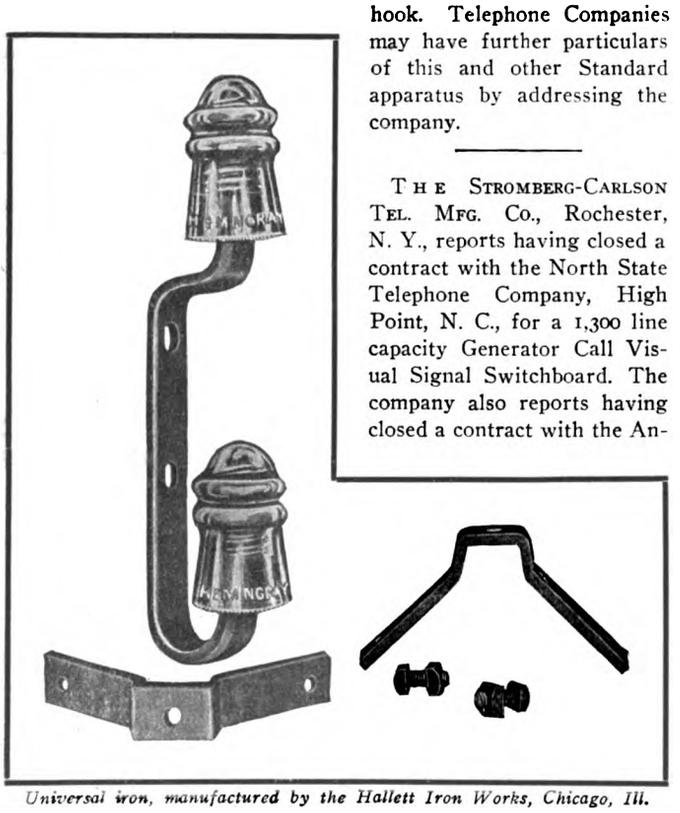
The advantages of this device, for subscribers drop purposes, as presented by the manufacturers, lie in the use of single, separate conductors supported on standard glass insulators, instead of the employment of insulated twisted pair wires. The commercial value of this method, it claims, can be readily discovered by refering to a few figures as follows:

Twisted drop wire costs from $70.00 to $100.00 per mile, according to quality. If weather-proofed conductors are used the cost will be from $12.00 to $14.00 per mile per conductor, or at the average cost of $26.00 per pair mile. Subtracting this from the cost of the twisted pair drop wire illustrates the advantage. Eight or nine cents on an insulator support at two or three points along the length of the drop it claims makes better work and saves fifty times its cost at each subscriber's premises.

NEW TYPE SWITCH HOOK.

THE Standard Telephone and Electric Co., of 348 Jefferson street, Milwaukee, Wis., presents its new hook, under the name of the Eldred Hook Switch, as the result of a series of experiments, having for their object improvements in certain distinct features of construction. The new hook possesses a vertical spring instead of a horizontal one, and embraces the following points of interest: It is strong and compact; the contacts are binding; hard rubber collars act on the main spring; the hook frame is entirely free from all circuits and is held securely with machine screws which pass through the escutcheon plate and woodwork.

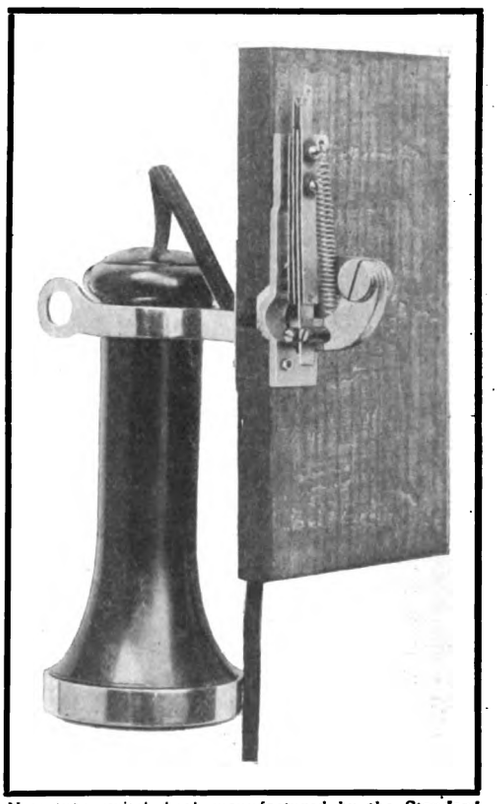
In the illustration the receiver is shown supported by the hook. Telephone Companies may have further particulars of this and other Standard apparatus by addressing the company.



Universal iron, manufactured by the Hallett Iron Works, Chicago, Ill.

THE STROMBERG-CARLSON TEL. MFG. CO., Rochester, N. Y., reports having closed a contract with the North State Telephone Company, High Point, N. C., for a 1,300 line capacity Generator Call Visual Signal Switchboard. The company also reports having closed a contract with the Anderson Telephone Company, Anderson, S. C., for an 1,800 capacity Lamp Line Signal Multiple Switchboard. The General Manager, Mr. E. S. Moorer, is a progressive and experienced Independent telephone man. He says he is going to make this one of the most modern and up-to-date plants in the South. The Stromberg-Carlson Co. has also secured a number of contracts for complete exchange installations in the Southern States.

G. M. GEST, SUBWAY CONTRACTOR of New York and Cincinnati, has been awarded a conract for the construction of a complete underground conduit system at Washington, D. C., for the Western Union Telegraph Company. This conduit system will be constructed of specially made steel pipe instead of clay and will connect all of the Western Union Telegraph Co.'s offices as well as the department buildings in and around Washington. Work is to begin by the first of August and several hundred men will be employed.



New type switch hook manufactured by the Standard Telephone and Electric Company, Milwaukee, Wis.

THE DENIO GENERAL ELECTRIC COMPANY, Rochester, N. Y., has prepeared for publication, an interesting folder, descriptive of its patented telephone fire alarm, and other protective signalling apparatus. The folder states, that these devices have been tested, examined, and approved by some of the best electrical engineers of the country. This company lays special emphasis upon the value of its telephone fire alarm, on account of the amount of protection it affords. It points out the cost to subscribers as very low for the reason that a signal box can be installed for a nominal sum. It also adds to this information, by stating that if thermostats are required, the only additional expense is that of the wiring and material. The Denio system can be installed in any building having a central energy telephone.

THE NORTH ELECTRIC COMPANY, Cleveland, Ohio, reports the following recent exchange equipment shipments: Oswego, N. Y., 200-line addition; Yellville, Ark.; Alvord, Texas, branch of Central Exchange; Sandusky, Ohio; New London, Ohio; Norwalk, Ohio; Ada Telephone Company, Dunkirk, Ohio; Unity Township Telephone Company, East Palestine, Ohio; Freeport, Ohio; Brevard County Telephone Company; Cocoa, Fla.; Tuttle, Ind., Telephone Company, Chico, Texas; Bishopville, Ohio; Delaware, Ohio; Muncie, Ind.; Deposit, N. Y.; Richwood, Ohio; Bartram, Texas; Dayton, Ohio; Riley, Ind.; Kenton, Ohio; Sulphur Springs, Texas; Windsor, Ohio; St. Mary's, Ohio; Mansfield, Mo.; Sayre, Ohio; Marion, Ohio; Athens, Ohio; Yukon, Okla.; West Richfield, Ohio; Somerfield, Pa.; Cortland, Ohio; Natchez, Miss.; Leslie, Mich.; Boston, Ohio; Danville, Ohio; Mt. Vernon, Ohio; College Corners, Ohio; Leipsic, Ohio; New Concord, Ohio; Manor, Pa.; Glassport, Pa.; Portage, Ohio; Pittsburg, Pa.; Central Branch Exchange; New Knoxville, Ohio; Springfield, Ohio; and Clarence Center, N. Y.

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SUMTER

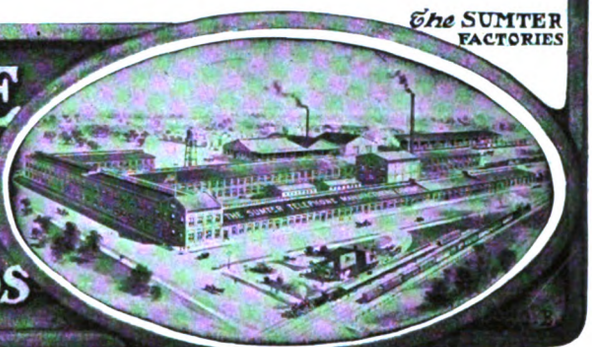
SOLD ON QUALITY-NOT ON PRICE

THE WORKS INSIDE OF A WATCH

'tis said, have nothing to do with the case; But the excellent piano finish upon the cabinets of Sumter Telephones is a pretty good indication of the high grade materials used in their construction. And they cost no more than the ordinary kind.

Can't we prove our statements by a trial order?

The SUMTER FACTORIES



THE SUMTER TELEPHONE MANUFACTURING CO.
SUMTER, S.C., U.S.A.
TELEPHONES, SWITCHBOARDS

MONARCH ELECTRIC & WIRE CO.

WIRE

SUPPLIES

We Manufacture Galvanized Strand and Weatherproof Line Wire

Send your orders for your requirements to us and receive the benefit of a large and complete stock of all kinds of telephone construction material, assuring prompt shipments at the lowest possible price.

125-127 SO. CLINTON. ST. CHICAGO. ILL.

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LIST OF EXHIBITORS AT THE ELECTRICAL CONTRACTORS' EXHIBITION, BOSTON

THE AMERICAN ELECTRICAL NOVELTY AND MANUFACTURING CO., New York, exhibited "Ever Ready" dry batteries which are particularly adapted for telephone work; and "Noscru" push buttons. The firm was represented by F. J. Alvin, New York manager; S. S. Shepard, Northeastern manager; W. G. Mills, Western salesman, and R. A. Schoenberg, manager of Sarco specialties.

THE APPLETON ELECTRIC CO., Chicago, Ill., had a small exhibit of a few of its specialties. It showed, among other things, several styles of arresters, fuses, fuse wire and wire connectors.

THE ALBERT CHAMPION COMPANY, Boston, Mass., made a display of foreign make of voltmeters, ammeters and combination instruments, also induction coils.

THE CHASE-SHAWMUT CO., Newburyport, Mass., was represented by J. J. Miley, Frank D. Masterson, and Harry B. Moore, sales' manager. The company had an exhibit of National Electric Code Standard enclosed fuses, made in accordance with the latest requirements of the Fire Underwriters. The company also showed marlin hangers and the Boston cable clip. Mr. Moore states that since Jan. 1 of this year it has sold over 2,000,000 marlin hangers.

THE S. H. COUCH CO. of Boston, Mass., telephone manufacturers, was the recipient of many compliments for its prettily decorated booth and the very complete line of apparatus, including many novel features. It departed from the stereotyped method of a display board, and all apparatus was mounted on revolving pedestals of artistic design. In addition to the regular style of telephones, there was shown the Couch automatic reset telephone, and the Couch apartment house telephones.

The line of automatics was very complete, including flush and surface wall sets, hand microphone and all nickel desk sets. One of the noticable features of the automatic is its extreme compactness, a 30 station button board taking a space of but 6¼ inches. The buttons are surrounded by an ornamental button plate and the whole instrument indicates great care in design. The many visitors were entertained by Messrs. S. H. Couch, Wm. Couch, C. E. Monroe, F. C. Whitman and C. Moulton.

COUCH & SEELEY CO., Boston, Mass., had an excellent exhibit of telephones and switchboards. F. C. Redfield represented the company and explained the line of common battery and magneto interior and exchange apparatus, and "Transite," a compressed asbestos material largely used as fireproof lining for telephone switchboard cabinets, and electrobestos and transite wire conduit for interior wiring.

THE CONDIT ELECTRICAL MFG. COMPANY, Boston, Mass., had an attractive display of its apparatus, which included a line of marline hangers.

THE CUTTER ELEC. & MFG. COMPANY, Philadelphia, Pa., was represented by W. C. Jessup, sales engineer. Among other devices, this firm displayed the I. T. E. circuit breaker.

THE DEVEAU TELEPHONE MFG. COMPANY, New York city, had a tastefully decorated booth in a prominent corner of the hall. The chief features were a number of luxurious chairs, tables and desks in the mission style, which were a convenient lounging center for delegates to the National Electrical Contractors' Association convention. Mr. DeVeau when he was not regaling his friends with new and old stories, told in his inimitable style, talked up the merits of his intercommunicating telephones, and especially his latest, an automatic with a ball bering release. As a memento of the occasion Mr. DeVeau gave out a regulation English monocle with silken cord and the firm's trademark chased on the glass.

THE ELECTRIC GAS LIGHTING COMPANY, Boston, Mass., had a remarkably fine showing of interior telephones and switches. It was represented by H. C. Thomson, general manager, and W. F. Abely, also Mr. Boardman, Mr. Young, Mr. Sherman, Mr. Howes, Mr. Norris, Mr. Lee, besides Mr. Haines, manager of the Chicago branch, and Mr. Bongard from the Toronto branch. Much favorable comment was made upon its new metallic circuit automatic intercommunicating telephone. The company claims this is the most important departure in the history of interior telephone manufacture, inasmuch as it gives a complete and separate metallic circuit to every connection. Not only does the operator at will select the metallic circuit of the desired correspondent, but when a conversation is in progress interruption by outsiders is entirely impossible, a result never before obtained in intercommunicating apparatus.

It also exhibited its "Rotokoll" switchboard, which is a very neat and effective instrument. Another interesting feature of its exhibit is the stormproof instrument employed in its marine installations, such as were installed on the Minnesota and Dakota of the Great Northern S. S. line running to Oriental ports from Seattle. The company displayed besides the outside instrument for use on the bridge, the flush metal face room instrument, and a section of the marine navy drop annunciator used on these installations. It also showed a very perfect and ingenious distribution box, a saving of time and money in the installation of intercommunicating telephone systems.

DUNTON & FIELD, Cambridge, Mass., have just put on the market a new tree insulator which was exhibited for the first time at the electrical exhibition in Boston. This insulator consists of various joints and arms, permitting the insulator to be fastened to limbs of a tree at any angle, and relieving the wire of all strain or rubbing. The booth of the company contained a large tree equipped with the insulators showing them in actual use.

G. M. GEST, the subway contractor of New York and Cincinnati, had a prominent and attractive space in charge of W. T. Jackson, Western representative. In addition to a liberal supply of printed matter in Gest's catchy style, the visitors were interested in numerous photographs of subway work done by Gest in various cities, and particularly of the systems now being built in Mexico City, Mexico, and in Canada.

THE HOLTZER-CABOT ELECTRIC CO., Brookline (Boston), Mass., showed a full line of its telephones, magneto and common battery exchange and intercommunicating. A large display board was fitted with watchman's clocks, magneto generators, annunciators, telephones of all types, linemen's test sets, while on tables were shown several types of ringing and charging machines, dynamotors, etc., motor generators, busy-back attachments, party line selective signalling generator, etc. A. P. Waterman of the sales department was in charge, and was assisted by L. E. Hill and E. F. McCobb, traveling representatives.

THE PETTINGILL ANDREWS CO., Boston, had a large, cool space in which was displayed a line of telephone and electric supplies.

JOHN L. GLEASON, Jamaica Plain, Boston, Mass., employed a

(*Continued on Page 91.*)

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The Archambault Kerosene Furnace

—THE—

Central New York Telephone and Telegraph Co.

Syracuse, N.Y., June 23, 1905.

The Archambault Co.,
113 West 125th St.,
New York City.

Gentlemen:-

This is only to say that we have given your furnace a thorough test and find it to be a first class article in every respect I have had this furnace out among several splicers and after they have become familiar with it, they are unable to criticise a single detail.

By the use of this furnace, a large saving in fuel can be effected and with one filling, we find that the kerosene lasts much longer than the gasoline.

No objection is raised by the Insurance Companies to the use of the kerosene furnace in or about buildings, but the same is not true of the gasoline furnace.

After our present stock of gasoline furnaces is exhausted, we shall adopt as our standard the kerosene furnace, and you will undoubtedly receive our orders in the future.

Truly yours,

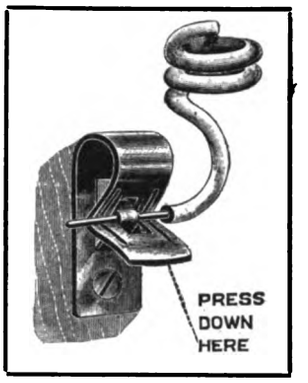
Robert McGillespie.
Cable Foreman.

RMG

Five days after receipt of this letter the above company ordered 24 Archambault Kerosene Furnaces. Write for prices and circular.

THE ARCHMABAULT CO., 113 W. 125th St., N. Y. City

REMEMBER



Batteries cost no more when equipped with the Fahnestock Spring Binding Post than with the old style Screw Post.

Let us send you a sample. It's free.

Fahnestock Transmitter Co.

132 HAVEMEYER STREET, BROOKLYN, N. Y.

TELEPHONE TEST INSTRUMENTS

STANDARD W. U. TEST SET

The W. U. Test Set was designed by us at the request of the W. U. Telegraph Company, and has been adopted by them as their official standard for use in all their testing stations. It has also been adopted by the Bell Telephone Company, Ltd., of Canada; the U. S. Telephone Company, of Cleveland, etc., etc.

The "Model K" Set is the most complete, compact and convenient set on the market, and is a favorite with telephone men; makes every fault and resistance test, as well as many special tests.

Then there is the "Universal" and the "Jr. W. U. Set."

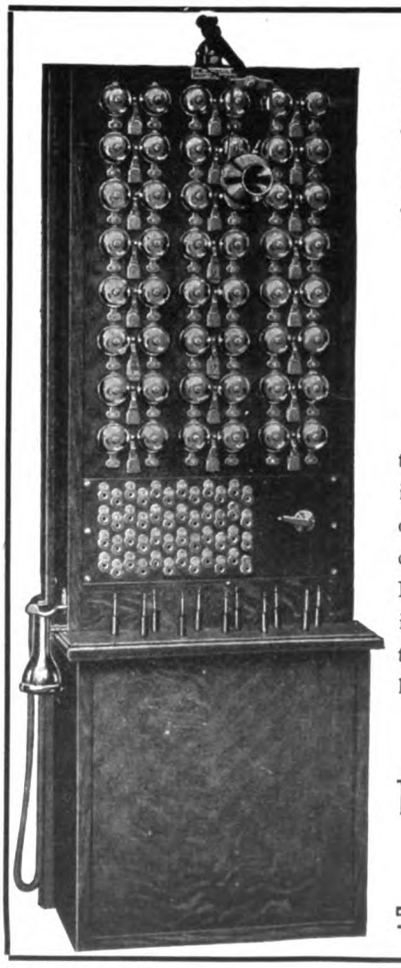
We also make a full line of instruments for Cable Testing, Conductivity and Inductance Tests, etc.; Galvanometers for Shipboard; Electrometers, Condensers, etc., etc.

Our Catalogue Matter is a Liberal Education.

ADDRESS TELEPHONE DEPARTMENT

THE WILLYOUNG & GIBSON CO.

38 West 13th Street, New York City



THE

SIMPLEX RELAY SWITCHBOARD

Especially for

Rural Installations

A good board is a pride to an Exchange. When it is simple and efficient in operation, its price becomes a secondary matter. Let us prove to you that it is what you want. Will tell you all about it, if you let us.

The Williams Telephone & Supply Co.

59 Central Ave. Cleveland, Ohio

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THE WEEK'S MESSAGES

FINANCIAL.

CAMARGO, ILL.—The Home Telephone Company has increased its capital stock from $6,000 to $10,000.

CENTRAL LAKE, MICH.—The Traverse Bay Telephone Company of Central Lake, Mich., has increased its capital stock from $4,000 to $30,000.

GRAND RAPIDS, MICH.—At the regular July meeting of the board of directors of the Citizens' Telephone Company the quarterly dividend of 2 per cent. was declared.

CAMDEN, N. J.—The stockholders of the Eastern Telephone & Telegraph Company of this city have ratified the action of the board of directors in issuing $1,000,000 worth of consolidated mortgage bonds to bear 5 per cent. interest. The money so derived is to be used in extending the lines of the company through South Jersey.

BATESBURG, S. C.—The Batesburg Telephone Company has increased its capital stock from $500.00 to $2,000.

FRANCHISES.

SAN BERNARDINO, CAL.—Nathan W. Tarr has been granted a fifty year franchise to construct and operate a telephone system.

EVANS, COLO.—The town board of Evans has granted a telephone franchise to C. H. Ramsey of Greeley.

CANNELTON, IND.—The Eckerty, Branchville & Cannelton Telephone Company has been granted a franchise to run lines through Dubois and Perry counties.

JEFFERSON, TENN.—The Peoples Telephone Company has applied for a franchise.

ELECTIONS.

PATERSON, N. J.—At the annual meeting of the Paterson, Passaic and Suburban Telephone Company the following directors were elected: George A. Post, J. W. Lindsay, F. A. Demarest, W. H. Hamill, R. P. Wilson, Barker Gummere, Jr., Walter Bamford, W. S. Hancock, W. D. Blauvelt, E. C. Stokes, Richard Morrell, Wayne Dumont and H. R. Swartz. The executive officers elected were: H. R. Swartz, president; George A. Post, first vice-president; W. S. Hancock, second vice-president; Barker Gummere, Jr., treasurer; J. W. Lindsay, secretary; Wayne Dumont, counsel; F. A. Demarest, general superintendent.

DUNDEE, N. Y.—The Dundee Telephone & Telegraph Company has elected the following officers: President, C. J. Watson; vice-president, Clayton J. Howell; treasurer, Robert B. Sworts; secretary, H. B. Harpending; manager, Silas A. Price.

NEW COMPANIES.

ROSEDALE, IND.—The Rosedale & Fontanet Telephone Company of Parke and Vigo Counties has been incorporated with a capital stock of $3,000. It will establish exchanges at Rosedale and Fontanet, and will extend its lines throughout the above named counties. Thos. M. Patterson heads the board of directors.

EXIRA, IA.—The Wakefield & Cass County Telephone Company of Exira has been incorporated with a capital stock of $2,000. President, A. F. Anderson; secretary, J. C. B. Anderson.

SULLIVAN, KY.—The Sullivan Telephone Company has been incorporated.

WINGO, KY.—The Wingo Telephone Company has been incorporated with a capital stock of $1,500.

CENTREVILLE, MO.—The Centreville Telephone Company has been incorporated with a capital stock of $2,000. Incorporators: J. J. Jamison, W. S. Carter, Z. C. Smith and others.

MAGNOLIA, MO.—The Magnolia Telephone Company has been incorporated with a capital stock of $15,000. Incorporators: R. L. Moore, J. G. Brown and Gus Kohn.

JERSEY CITY, N. J.—The United States Pay Station Telephone Company, with registered office at 15 Exchange Place, Jersey City, has been incorporated with a capital stock of $50,000. Incorporators: H. O. Coughlan, T. F. Barrett and J. W. Woods.

BROOKLYN, N. Y.—The Commonwealth Telephone Company has been organized with a capital of $200,000. Directors: E. M. Brooks, Daniel Bohre, Brooklyn, N. Y.; J. A. Crawford, Montclair, N. J.

SOUTHWEST OSWEGO, N. Y.—The Wiltseville Telephone Company has been incorporated with a capital stock of $500. It will operate lines from Southwest Oswego through the towns of Oswego and Hannibal. Incorporators: Otis A. Kipp, Fred Fanning, C. Tuchor and others.

ORAN, MO.—The Scott County Telephone Company, of Oran, has been incorporated with a capital stock of $12,000. Incorporators: F. J. Stein, A. V. Scheiber, N. H. Stubblefield, Jr., M. Helmbacher and others.

WATERVILLE, O.—The Citizens' Telephone Company has been organized, and will take over the plant of the Waterville Telephone Exchange. D. J. Farnsworth is to be president and general manager.

EAU CLAIRE, PA.—The Eau Claire Telephone Company has been chartered with a capital of $15,000. A. O. Miller, of Eau Claire, is the treasurer.

MASTERSONVILLE, PA.—The Mastersonville Telephone Company has been chartered with a capital of $10,000. Jeremiah S. Hackman, of Mastersonville, is the treasurer.

ROCK HILL, S. C.—J. H. Milling, of Rock Hill; W. C. Percival, of Ogden, and associates are organizing a company to construct and operate a telephone system from Rock Hill to Ogden.

GARY, S. D.—The Gary Telephone Company has been incorporated with a capital stock of $10,000. Incorporators: H. Bassett, J. H. Greene, W. F. Gordon and others.

MONTELL, TEXAS.—The Citizens' Telephone Company, Montell, Uvalde county, has been incorporated with a capital stock of $1,000. Incorporated by A. S. Baylor, T. S. Sutherland and others.

MISCELLANEOUS.

PAOLO, KAN.—The Farmers' Mutual Telephone Companies of Miami and Linn counties, Kan., and Cass and Bates counties, Mo., has held a preliminary meeting for the formation of an association for mutual beneficial purposes. Another meeting is to be held at Lewisburg, Kan., on July 29 to complete the work.

FRANKFORT, KY.—The State Board of Valuation and Assessment fixed the franchise value of a number of telephone corporations this week as follows: Jessamine Home Telephone Company, $12,464; New Castle Home Telephone Company, $3,000; Frankfort Telephone Company, $6,440; Carrollton Telephone Exchange Company, $10,000; Eminence Telephone Company, $9,000.

COLUMBUS, OHIO.—The Citizens' Telephone Company is making rapid progress in the work of changing over to the automatic system, which will be completed as soon as possible.

HARRISBURG, PA.—A comparative statement issued by the United Telephone and Telegraph Company shows that during the last six months the number of telephones in operation has increased from 18,140 to 18,667, the net total receipts from $5,834.77 per month to $7,222.84 per month, the gross receipts from rentals of telephones per month from $32,631.66 to $34,254.25, and the total annual gross receipts from $461,597.16 to $497,733.48. This increased business was obtained without any extrardinary expense and with no special effort.

ORANGE, TEXAS.—The bondholders of the Orange, Texas, Telephone Company, at a recent meeting held in Kenton, Ohio, appointed a finance committee and a bondholders' committee to effect a complete reorganization of the company.

PERSONAL.

J. H. DEAN, of Geneva, Neb., has been appointed local manager for the Nebraska Telephone Company at Tecumseh, Neb.

H. S. DURANT, of the sales department of the Automatic Electric Company, Chicago, Ill., has been appointed manager of a new branch office recently opened by the company at Scranton, Pa.

T. A. EDWARDS has been appointed manager for the Sunset Telephone Company at Santa Monica, Cal.

A. M. FORTH has accepted a position with the Central Union Telephone Company at Indianapolis.

JOHN E. FRAZIER, of Elmira, N. Y., has been appointed manager for the Empire State Telephone and Telegraph Company at Auburn, N. Y.

J. W. HAMILTON has been appointed manager for the Douglas County Telephone Company at Tuscola, Ill.

GEORGE E. LEWIS has been appointed manager for the Wolverine Telephone Company at Coldwater, Mich.

EUGENE McALEAVY has been appointed manager for the Wisconsin Telephone Company at Merrill, Wis.

MAJOR EDGAR RUSSELL, on duty in the office of the chief signal officer of the army at Washington, has been ordered to report to the

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Kellogg Switchboard and Supply Co.

CHICAGO, ILL.

Wholesalers of **Michigan White Cedar** **POLES** *of* **QUALITY**

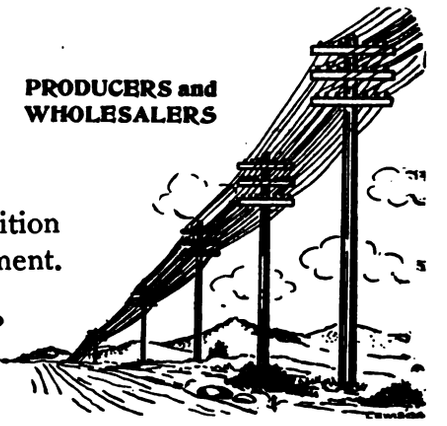
Five Yards ***Prompt Shipments***

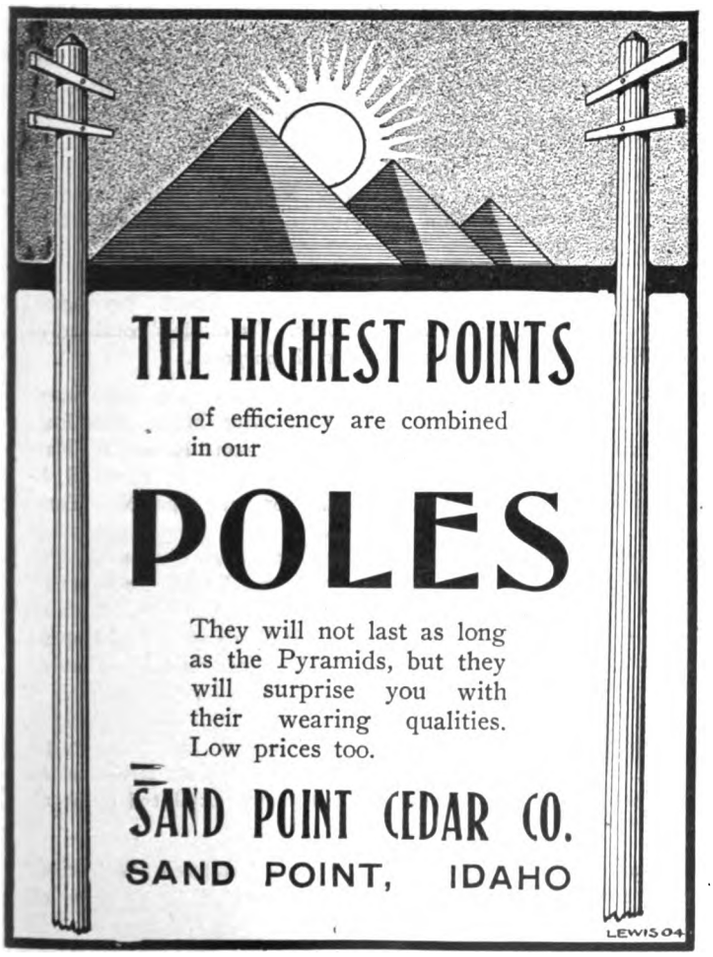
PITTSBURG & LAKE SUPERIOR IRON CO.,
ESCANABA, MICHIGAN.

PRODUCERS and WHOLESALERS

WE always carry a large stock of all sizes of White Cedar Poles, and having yards on all principal railroads in Northern Michigan and Minnesota, are in position to make immediate shipment.

"From the Stump to the Line."

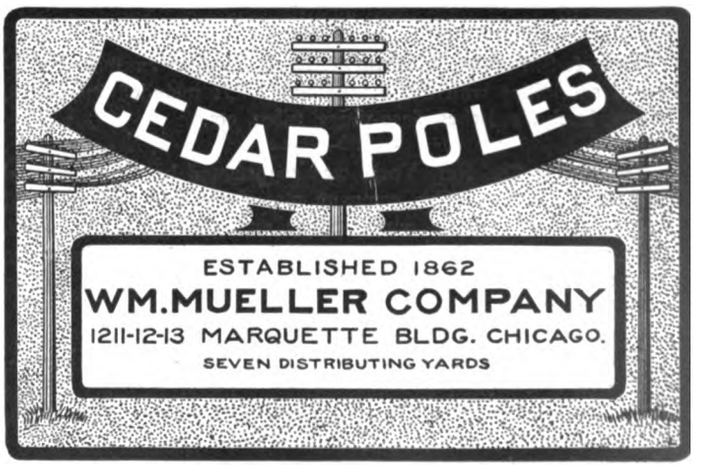




WHITE CEDAR POLES

From a Minnesota Customer: "The shipment of poles you sent me arrived and proved to be all and more than we expected."

PAGE & HILL CO., LUMBER EXCHANGE MINNEAPOLIS, MINN.



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Isthmian Canal Commission, to go to the Isthmus of Panama and install a complete system of telephone and telegraphic communication in the canal zone.

W. H. MOON, of Toledo, Ohio, has been appointed manager for the Home Telephone Company at Vincennes, Ind.

W. C. POLK has accepted a position as engineer with the Central Telephone Construction Company at Birmingham, Ala.

L. VANDERBECK has been appointed superintendent of line construction for the Michigan Telephone Company at Kalamazoo, Mich.

A. T. WHITTLE has been appointed manager for the United States Telephone Company at Waterloo, Ia.

W. WOOD has been appointed general manager of the Columbus, Ga., Automatic Telephone Company, succeeding A. G. Conoley, resigned.

GUY WOODARD has been appointed manager at Ely, Minn., for the Mesaba Telephone Company.

W. G. GUNN has resigned as advertising manager of the Kellogg Switchboard and Supply Company, Chicago. His health has not been good for some time, and it is his intention to take an extended vacation before entering business again. He will first visit Canada, and will then go to his home in Portland, Me., later taking a trip abroad.

C. W. STIGER, general sales manager for the Shomberg-Carlson Telephone Manufacturing Company, Rochester, N. Y., has resigned and will take a much needed rest.

New Construction in the Field

TORONTO, ONT., CAN.—The Board of Commissioners of the Temiskaming and Northern Ontario Railway will establish a government owned telephone system from North Bay to New Liskeard, 113 miles. The line will be built this summer.

ROCKFORD, ILL.—The Rockford and Interurban Telephone Company will build a toll line between Belvidere and Freeport.

EVANSVILLE, IND.—The Home Telephone Company, of Owensboro, Ky., is overhauling its plant. A new switchboard with treble the old one's capacity will be installed. E. W. Hall, of Rochester, N. Y., is superintending the work. The Owensboro company has constructed more than 200 miles of new lines this spring.

ROCKVILLE, IND.—The Parke County Telephone Company has moved its exchange and head offices into more commodious quarters. A new switchboard for local and toll service is being installed. The company operates exchanges at Montezuma, Rosedale, Mecca, Bellmore, Bridgeton and West Union. Frank Boyed is the general manager.

ARDMORE, I. T.—The new telephone exchange of the Pioneer Telephone Company at Muskogee is nearing completion. The new switchboard will have a capacity of 2,200 telephones.

ROSE CITY, MICH.—The Northeastern Telephone and Telegraph Company has made arrangements to put in a telephone exchange at Rose City. The company will also put up rural lines radiating from Rose City.

DULUTH, MINN.—The People's Telephone Company will soon erect a new building for the use of its offices and telephone exchange. It is proposed to erect a two-story structure 25 x 100 feet. The first floor will be used as the company's offices and workroom. The second floor will be devoted entirely to the use of the telephone exchange, while the basement will be utilized for the storage batteries and supply rooms.

LIMA, O.—The Union Telephone Company is to spend $50,000 in improving its plant.

BAKER CITY, ORE.—Extensive improvements in the local telephone system are now under way. The wires on the principal streets will be replaced by a single cable and the central office here will be entirely refitted.

WYOMING, PA.—The Merchants' Telephone and Telegraph Company is building a toll line from Scranton to Binghamton. This line will connect the People's Telephone Company with the York State Company, the lines of which extend as far north as Buffalo.

SHEBOYGAN, WIS.—The Citizens' Telephone Company is to place its wires underground.

LIST OF EXHIBITORS AT THE ELECTRICAL CONTRACTORS' EXHIBITION, BOSTON

(*Continued from Page 89.*)

novel booth arranged in the form of a moulding box, to display the Gleason Universal Moulding Boxes, which he manufactures. These boxes are used for running interior wires in moulding and are made in a variety of shapes for different conditions.

THE MANHATTAN ELECTRICAL SUPPLY COMPANY, New York, was represented by J. W. McDowell. This firm manufacture an extensive line of material for telephone construction purposes.

THE H. W. JOHNS-MANVILLE CO., New York, had a booth in charge of H. R. Trainer, manager of the Boston office, and W. R. Walsh, also of Boston. The company showed a complete line of national code standard fuses, lightning arresters, etc.

W. J. MURDOCK & Co., Chelsea, Mass., exhibited its "solid" telephone receivers. D. R. W. Murdock was in charge. The company has just put on the market a new vibrating bell which is moulded in solid rubber, also a new moulded push button, samples of which were freely distributed.

PASS & SEYMOUR, Inc., Solvay, N. Y., had an exhibit of electrical specialties which it manufactures. It included insulators, cleats, knobs, switches, fuse plugs, tubes, etc.

DOSSERT & Co., New York, was represented by H. A. Bristol and M. R. Jarvis. This company manufactures a novel line of connectors for electric wires, cables and gas and water pipes. In the near future it expects to perfect a new joint or sleeve for connecting telephone cable where a splice is made without wiping or soldering.

THE STANDARD UNDERGROUND CABLE COMPANY, Pittsburgh, Pa., was represented by C. J. Marsh, general manager of the New York office, and Clarence Weissblatt of the New York office.

THE TRUMBULL ELECTRIC MFG. COMPANY, Plainville, Conn., has just put a new telephone switch on the market which is quite an improvement over the old type. These, together with a full line of switches, wire connectors, circuit breakers, etc., were exhibited in a handsomely decorated booth, presided over by J. H. Trumbull, manager and treasurer of the company.

THE PROMETHEUS ELEC. COMPANY, New York, exhibited electric heating and cooking apparatus of all descriptions. Max Lowenthal was in charge.

THE STANLEY INSTRUMENT COMPANY, Great Barrington, Mass., was represented by S. O. Ochs. Its display consisted of electrical measuring instruments for all purposes.

JOHN A. ROEBLING'S SONS CO., New York, was represented by H. L. Shippy, treasurer, New York; Albert Mann, New England agent, salesman for copper wire, Boston; Frank W. Harrington, salesman for rubber covered wire, New York; S. B. Van Norwick, New England salesman for wire rope, New York.

THE SAFETY ARMORITE CONDUIT COMPANY, Pittsburgh, Pa., exhibited a special line of electric conduits. This is made in two types. "Loricated," which is a mild steel welded tube coated inside and out with a superior grade of flexible waterproof enamel; and "Galvaduct," which is similar to Loricated, but is galvanized before the enamel is applied.

THE SIMPLEX ELECTRIC COMPANY, Boston and Cambridge, Mass., was represented by Mr. Nichols, C. W. Richards and A. W. Doe. Besides heating apparatus this firm exhibited telephone wire.

HERBERT W. SMITH, Boston, Mass., exhibited "solderine" paste for soldering purposes. This is a new composition which tins the metal before soldering and also acts as a flue.

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CENTURY
100% GOOD

THE PLATINUM ELECTRODE TRANSMITTER

originated, and manufactured only by us, will give you absolutely perfect service — on common or local battery systems.

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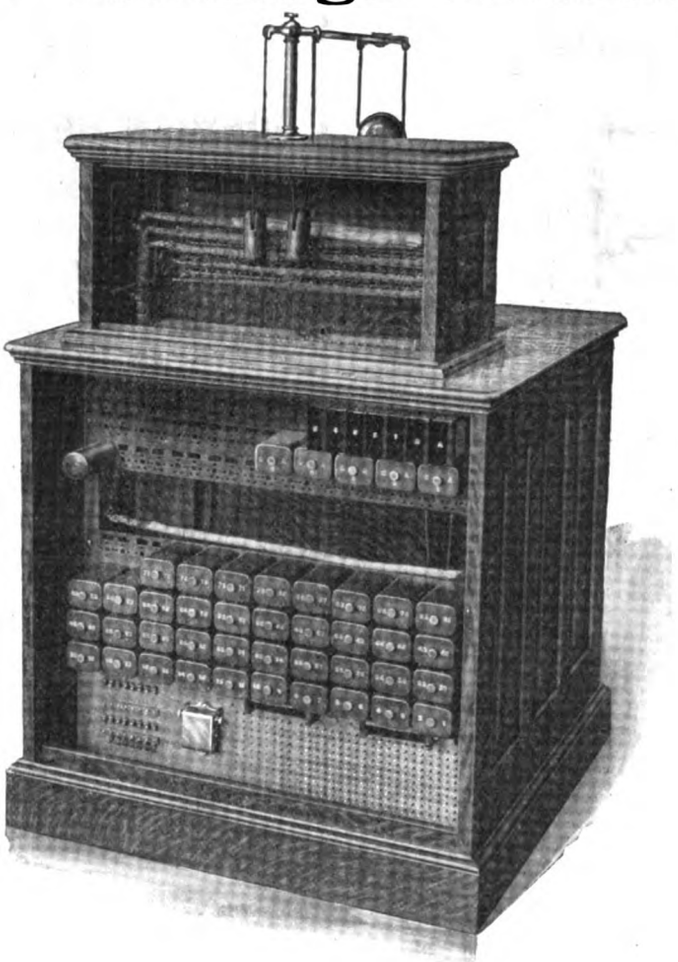

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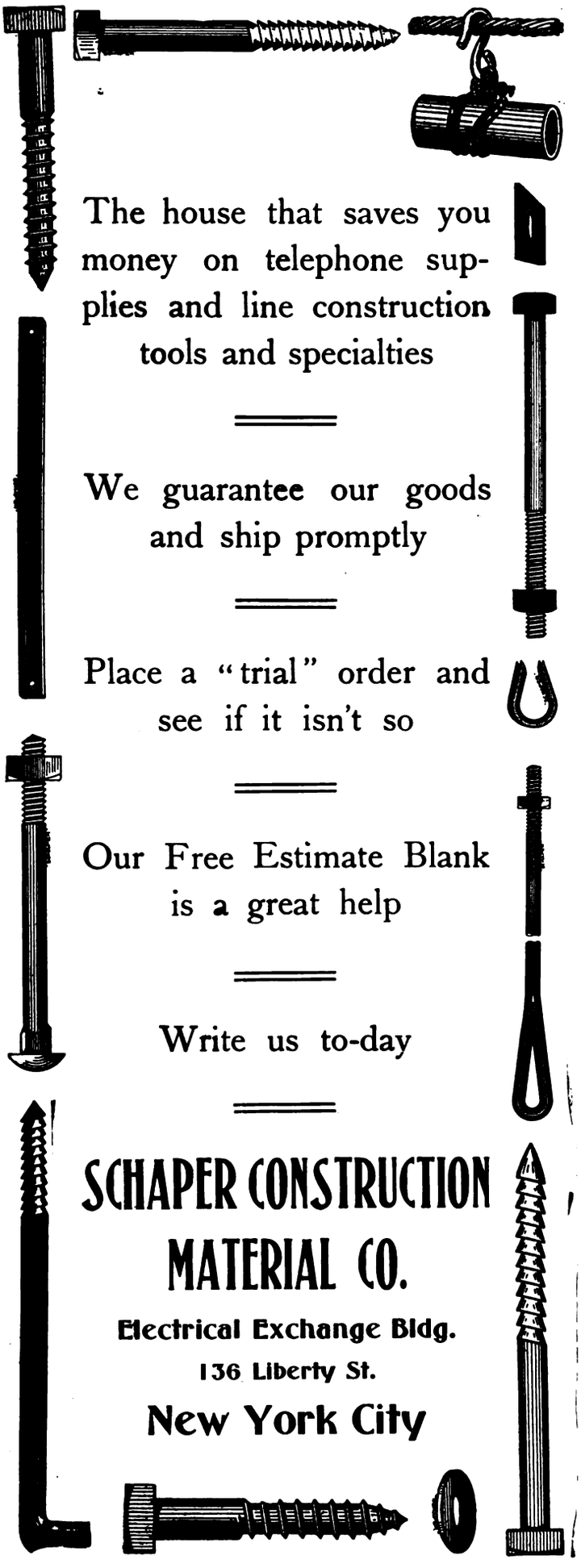

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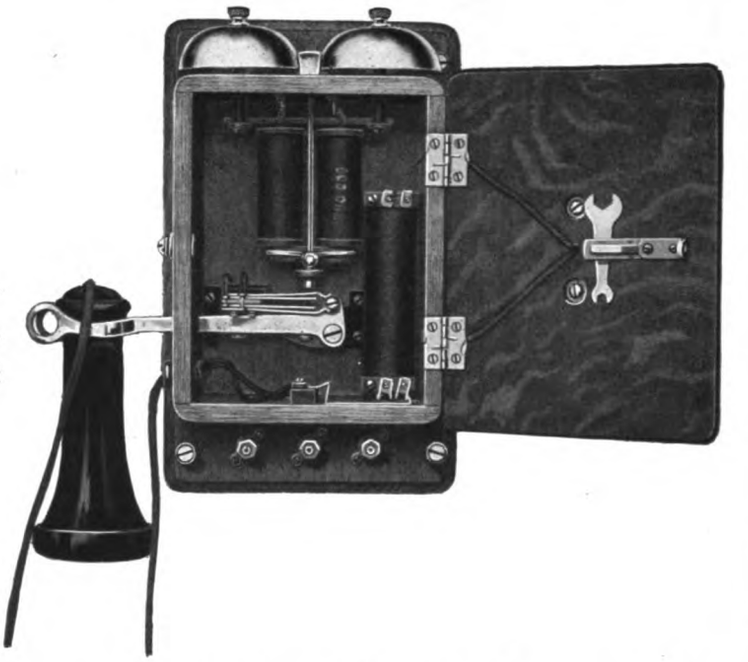
There is a distinct difference between this telephone as here shown and the "Just as good kind."



We designate this as our No. 532 Telephone. The illustrations give one a good idea of the construction of the cabinet and the way the parts are assembled.

The illustration showing the cabinet taken apart explains how one may get at the condenser, if necessary, to change it or examine the connections. The telephone is, of course, equipped with our standard transmitter, receiver, self-contained ringer, hookswitch, and an adjustable transmitter arm.

Our Circular No. 74 describes this telephone.

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ROCHESTER, N.Y. CHICAGO, ILL.

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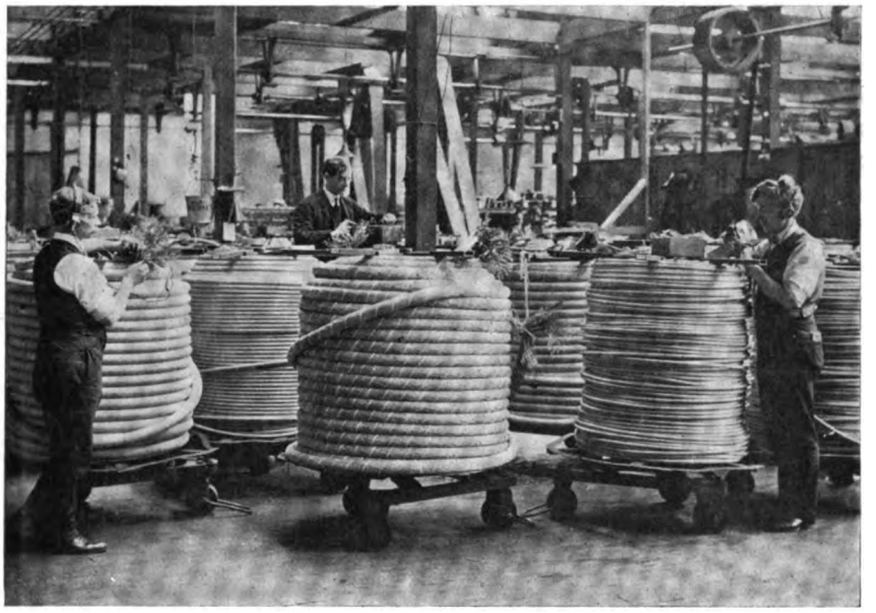
TESTING CABLE CORE



In last week's issue of this paper we illustrated our cable core machines and told how we manufacture cable core.

This illustration shows the finished core being tested for opens and crossed wires. This is a simple process familiar to most telephone men. The only apparatus required being two dry cells and a telephone receiver.

In testing for opens the connections are so made that a click in the receiver indicates a *continuous* wire. While in testing for crosses the absence of a click denotes a *perfect* wire. If a fault is discovered by the above tests it is located by a Wheatstone bridge.

The central figure shows one of our electrical experts performing such a test. The essential thing in these tests is to have a perfect cable core as it is the last mechanical operation before being leaded.

In next week's issue we will tell something about drying cable core.

In buying cable always look to *quality*.

STROMBERG-CARLSON TELEPHONE MFG'CO.
ROCHESTER., N.Y. CHICAGO., ILL.

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To WRITE TO ANDRAE Day

ANDRAE Telephone Condensers

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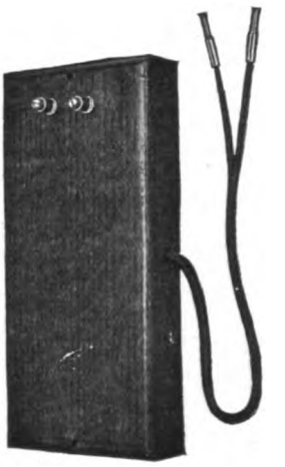

Andrae Condensers are being successfully used wherever installed. They not only allow perfect transmission of signals but improve the talking service.

The accompanying cut illustrates our new form of Condensers, fitted in a handsome quarter-sawed oak case, which is especially adapted for use in connection with telephones already in operation. Anyone can successfully install Andrae Telephone Condensers.

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A Modern and Perfect Method of Cable Splicing

By J. S. McLean.

In modern telephony, the open wire line is fast disappearing; the conduit has displaced the pole line, and now the aerial cable is relegating the open wire to the scrap-heap. Inasmuch as many exchanges are being constructed in the new fashioned way; open wire lines being used simply for the purpose of distribution; and as aerial cable is rapidly displacing all that are now in existence, the following description of the methods employed to make a cable joint may prove of interest. The tools required to splice the wires are a hammer, cable knife, drip pan, kettle, dipper, 2 dry cells, head receiver and a pair of wire shears or cutters.

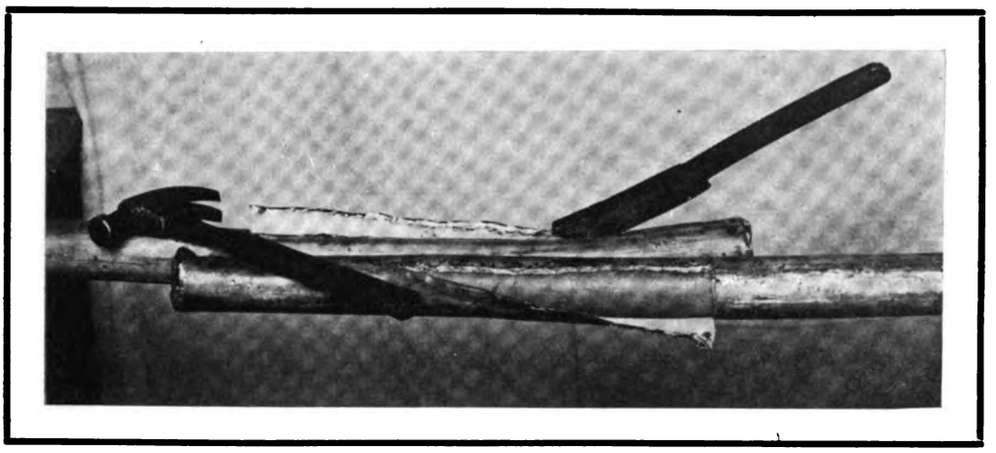


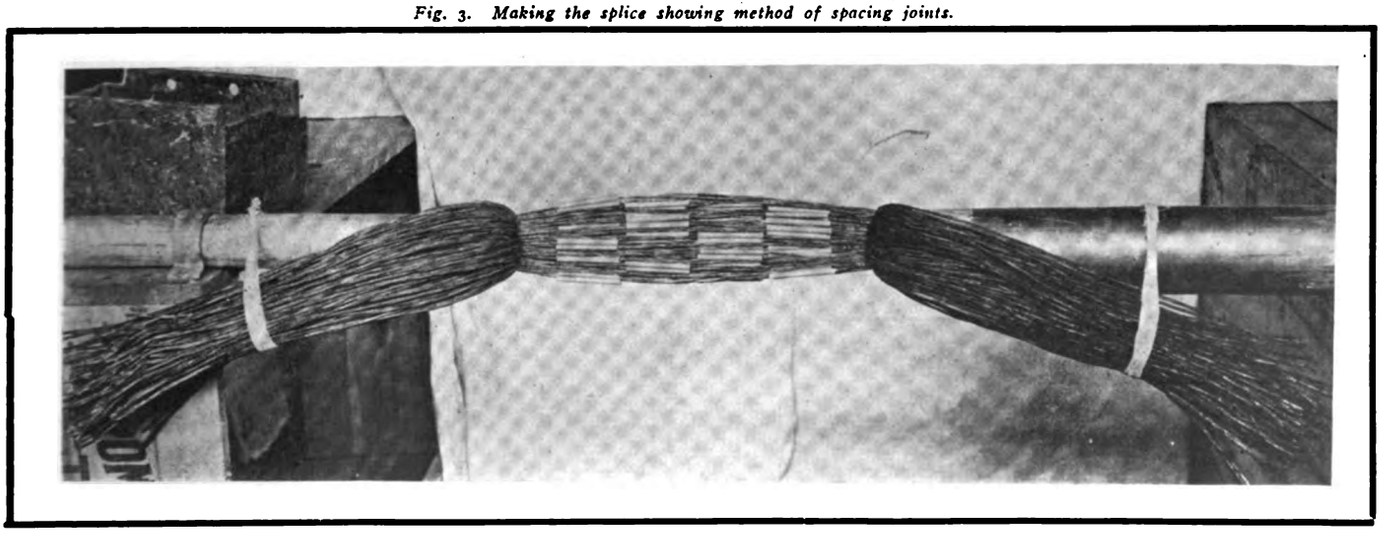
Fig. 1. Method of removing lead sheathing from ends of cable.

For making the joint the following plumber's tools are necessary: gasoline furnace, solder pot, iron solder ladle, shave hook, lead dresser and wiping cloths. Besides tools, the following materials are required: paraffine, paper sleeves, cheese cloth, lead pipe for sleeving, wiping solder, paper pasters, and tallow candle.

The first operation in making a splice is to place the cable in the approximate position it is to permanently occupy, the ends overlapping each other about 18", as shown in Fig. 1. Then proceed to strip the lead from both ends of the cable with hammer and cable knife, so as to leave about 16" of cable core exposed at both ends. This being done, slip a piece of lead pipe 18" long, and 1½" larger in diameter than the cable over one end and push it back out of the way. This sleeve, as it is called, will be seen in Fig. 2. Next remove the paper wrapping from the exposed core to within one inch of the lead sheath, bind the remaining paper to the wires with the cotton which holds them together, and thoroughly saturate the exposed insulated wires with hot paraffine. The paraffine should be heated to the point that it will sputter when a piece of paper is put into it. Fig. 2 shows how the conductors, paraffine kettle and pan should be arranged, with the operator in the act of pouring paraffine over the conductors. This is done to keep the moisture out of the cable during the process of making the splice.

Having finished, the next operation is to test for crosses, opens and grounds. To do this, strip the paper insulation from all the wires on one end of the cable leaving about 5" of bare cop-

Fig. 3. Making the splice showing method of spacing joints.



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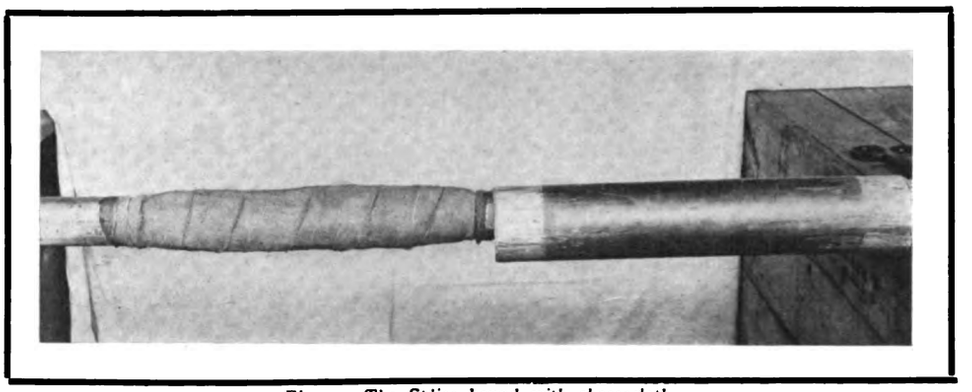


Fig. 4. The Splice bound with cheesecloth.

per exposed, bind the ends together by wrapping a piece of bare copper wire around them, and connect it to the lead sheath. Then go to the other end of this section of cable, strip the lead off for about 6" and cut all the wires clear.

To test, proceed as follows: Connect two dry cells in series, and attach a wire from one side of the battery to the lead sheath, connect the other side to one of the terminals of the receiver. The other terminal of the receiver should be provided with a piece of flexible cord or wire for making contact with the bare wires. Whenever a conductor is brought into contact with the receiver terminal or cord, a click in the receiver will be heard. Each wire should be tested in this manner by making contact with this receiver conductor. If no click is observed, it shows that the circuit is open and that that particular wire cannot be used. After all of the wires have been tested in this manner, return to the other end of the cable and begin testing as follows: Connect one side of the battery to the entire bunch of paired wires and take one conductor out of the bunch at a time, bare the insulation and touch the wire to the receiver terminal. If the wire is not crossed or grounded no click will be heard. Each individual conductor should be tested in this manner and if any one fails to click, it shows that it is crossed or defective in some manner and cannot be used.

All cables are provided with a few extra pairs, so that should a pair prove defective, there will still be the required number. In testing long lengths of cable for crosses, one will sometimes get a click when contact is first made to the wire, though successive contacts will decrease this click to a point where it cannot be heard. This is due to the *capacity discharge* and does not prove that the wires are crossed; only after several successive contacts, when the last click is heard as clear as the first one, may the wires be said to be crossed. If a bad pair is found, the cable which is to be spliced to, must also be tested in the same way as above explained. If a bad pair of wires should be found in this section, by splicing the bad pairs of each length together there will be in the finished length one pair with two bad spots instead of two pairs with one bad spot in each. After testing be sure and seal the tested ends securely with a soldered joint.

These tests, etc., having been made, the wires are ready to be spliced. First, separate the layers of pairs of the cable core into two halves and bind each half together loosely, so there will be twice as many bunches on each end as there are layers in the core. These should be bent back upon the cable and tied loosely, as shown in Fig. 3. Take the top bunch from each side, which will be the back half of the outside layer. After setting the ends of the lead sheath just 16" apart, take a pair from each bunch, stretch them straight and give the pairs one-half turn around each other. This will mark the insulation on each wire. Now strip the insulation from the ends of the wires back as far as this mark and untwist one pair and slip a paper sleeve over each wire. Take the red wire of one pair and the red wire of another and bring the ends together just as they were marked. Then twist the bare parts together for 1½ inches, fold the twisted ends down along the wire and slip the paper sleeve over the splice until it is entirely covered. Each pair throughout the cable should be connected in this manner, care being taken to space the splices of the wires of the different pairs as shown in Fig. 3, to make an even distribution.

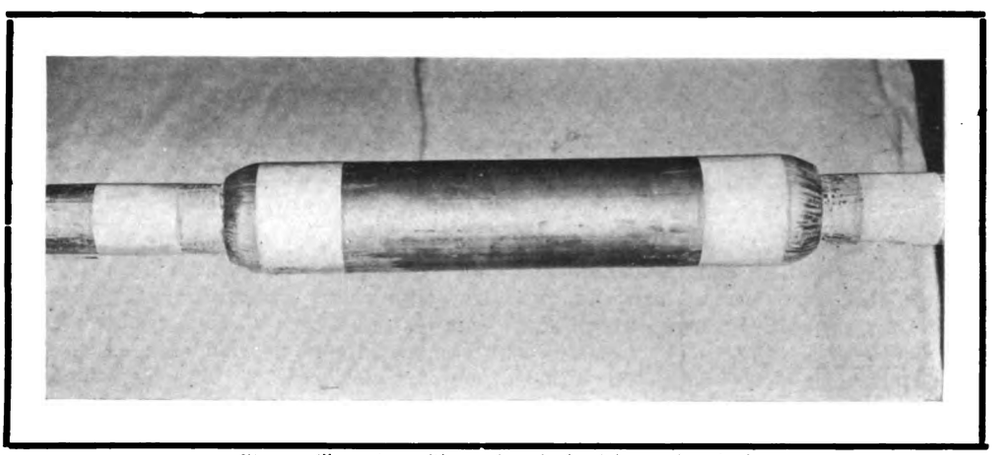
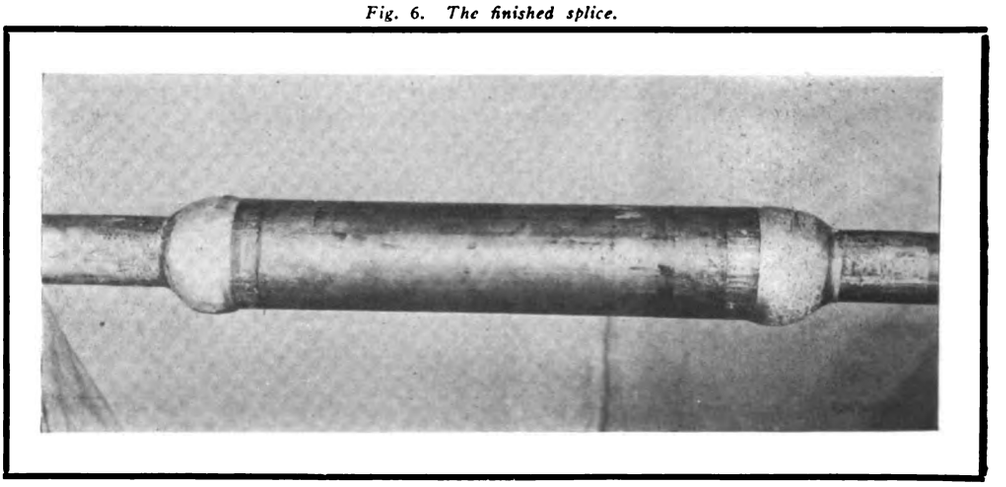


Fig. 5. Sleeve in position and ready for joints to be wiped.

After all the wires are joined, bind them together with a strip of cheesecloth, pulling them down fairly tight, as shown in Fig. 4. The cloth should be fastened with the twine just at the end

Fig. 6. The finished splice.



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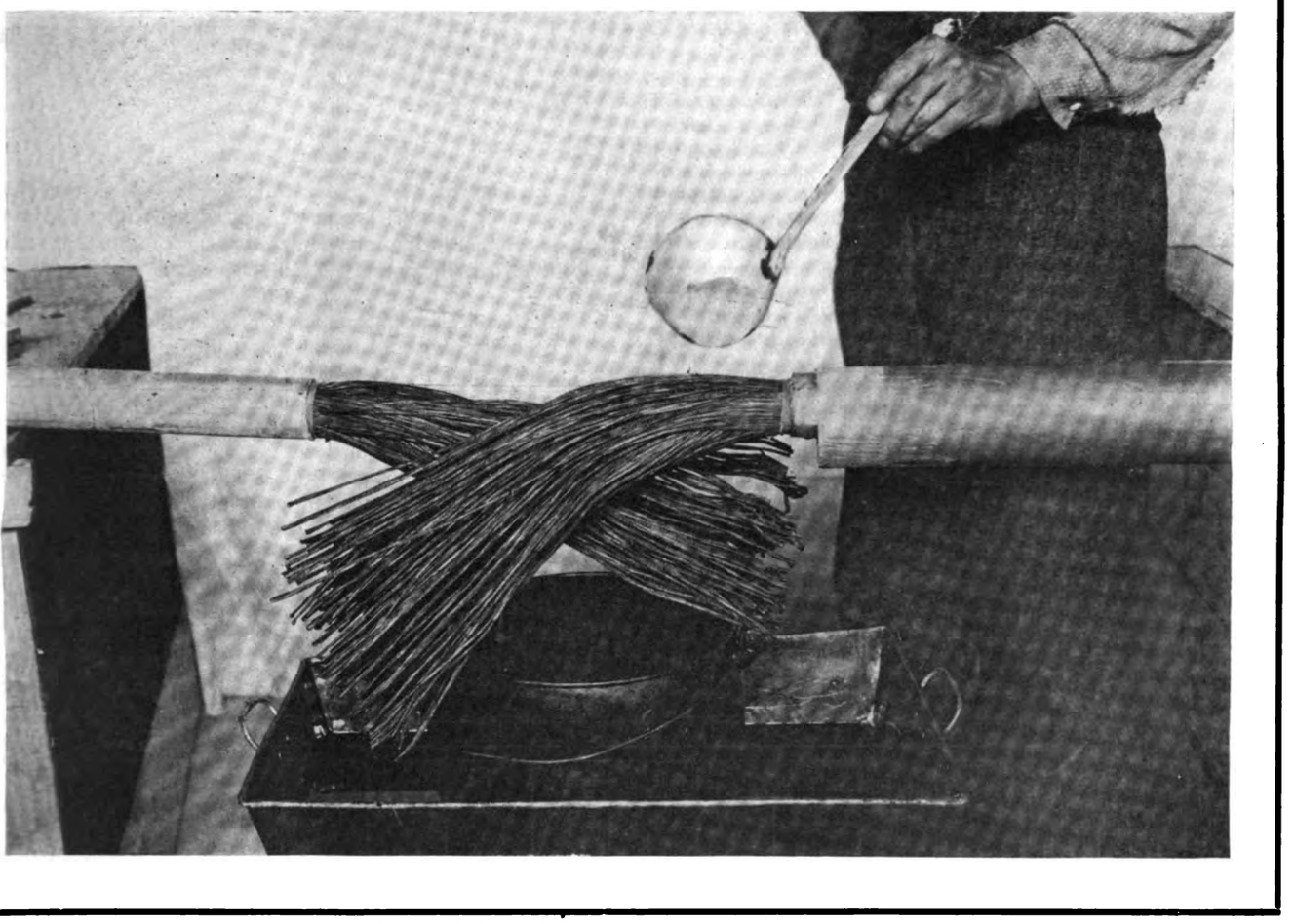
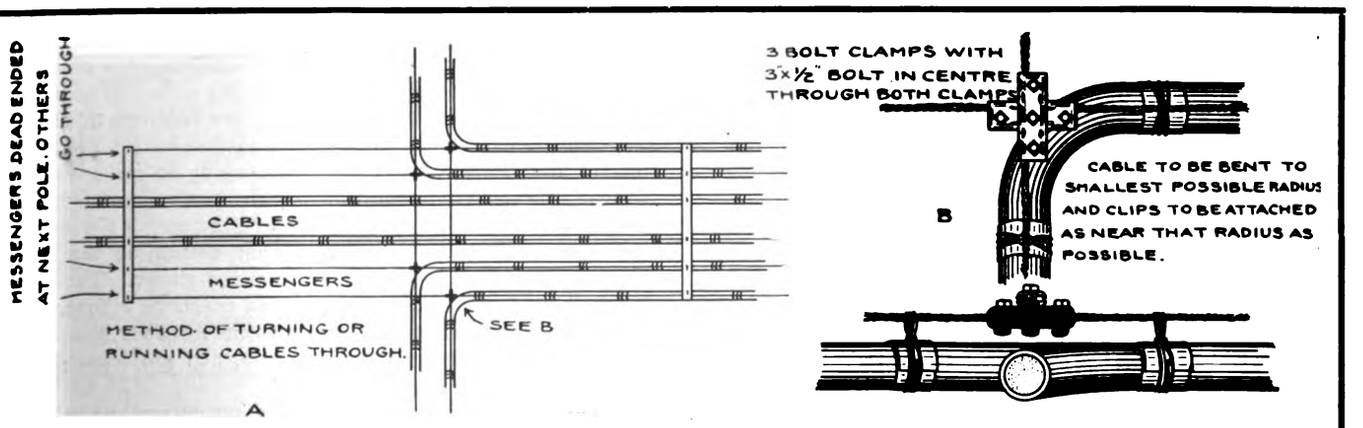


Fig. 2. Method of boiling out the ends to expel moisture.

of the lead sheath. After this has been done heat the paraffine and proceed as before, continuing to saturate the splice with the hot paraffine until it stops boiling. This precaution is taken in order to boil out all moisture that may have got into the insulation during the process of making the splice. Next slip the lead pipe over the joint, dress it with the lead dresser, and after cleaning the surfaces of the pipe and sheath where the joints are to be made, put a paper paster on both the sheath and the lead pipe about 2½" apart, Fig. 5. To wipe the joints, first cover the lead between the pasters with tallow. After the solder has been heated to a temperature that will char paper when thrust into it, pour it over the joint with the iron ladle, catch what falls from it with the wiping cloth and press the metal against the bottom of the joint, and as it cools wipe it off again. Do this until the cable gets so hot that the solder wipes the edges along the pasters clean. Pour enough solder on the cable to make the joint, press it into its approximate position, then wipe it smooth with the cloth pressing down on the two edges. After removing the paper pasters the splice is completed, Fig. 6.

This last operation should be done in one day, as it is not advisable to leave any cable open overnight. The writer would recommend the assistance of a plumber in wiping lead joints if one has never had any experience in this work. In wiping a joint, care should be exercised to see that there are no pin holes or openings through which moisture can enter. To examine the under side of a splice, a small mirror is often employed in such a way as to reflect the parts that cannot be directly examined, and thus reveal any imperfections in the joint.



Modern method of turning a corner with cables, by employing messenger wires without setting poles.

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An Eight-Party Selective Call, Local Battery, Party Line System—Article II

By H. P. Clausen.

In the preceding installment of this article the circuits of the different instruments used upon the eight party selective system have been shown, and the general operation of the two types of telephones has been discussed, with a brief reference to the mechanical construction of the apparatus. We now refer to Fig. 9, which shows a complete series of eight telephones connected to a pair of line wires and the earth return. Beginning at the left with station No. 1 we have the following table of the circuit and current combinations required for operating each instrument.

To call Station No. 1—Plus battery on tip, A. C. on sleeve.
To call Station No. 2—Minus battery on tip, A. C. on sleeve.
To call Station No. 3—Plus battery on sleeve, A. C. on tip.
To call Station No. 4—Minus battery on sleeve, A. C. on tip.
To call Station No. 5—Interrupted positive battery on tip.
To call Station No. 6—Interrupted negative battery on tip.
To call Station No. 7—Interrupted positive battery on sleeve.
To call Station No. 8—Interrupted negative battery on sleeve.

In order that the operation of each instrument may be thoroughly understood, take instrument No. 1, and by suitable means, as will be explained later, project a continuous positive current over the tip side of the line. It will be observed that the effect of placing a positive current upon the tip side of the circuit results in the energizing of the relay *R*, station 1, causing it to draw up its armature *A*, closing the contact *X*, and thus completing a circuit from the sleeve line wire to earth through the bell *B*, and owing to an alternating current having been placed upon the sleeve side of the line the signal at Station No. 1 responds.

Now passing to Station No. 2, observe that the positive current, while it passed through the relay *R* and impedance coil connected in series with it, the armature of the relay is not attracted, owing to its being polarized, so that it will respond only to a negative current. And this armature not being drawn up, the circuit through the ringer from the sleeve side of the line to ground, is open.

At Station No. 3 the positive current does not find a path to earth, owing to the ringer circuit now being open. The alternating current, however, finds a possible path from the sleeve side of the line through the relay and impedance coil to earth. But, as has already been explained, the relay is almost nonresponsive to an alternating current, and made completely so by inserting an impedance coil in series with it. Therefore, Station No. 3 is inactive.

At Station No. 4 the same condition is evident, as was found at Station No. 3. The positive current cannot find a passage to earth, while the alternating current does not affect the relay.

At Station No. 5 we find a transformer station, and the moment that the positive current was placed upon the tip side of the line, it resulted in the relay *R* drawing up its armature and closing the bell circuit *B* through the secondary *S* of the transformer *T*.

With this circuit combination, while the ringer circuit is closed, it must be remembered that a direct current is being projected through the primary of the transformer, and owing to the relay being somewhat sluggish in its action, the direct current becomes constant in strength before the relay armature is drawn up. This is a very important feature, for were the relay *R* quick acting, there would be likelihood of the bell *B* being sounded if only a single tap the moment that the current is placed upon the line, but when the current passing through the primary of the transformer has settled down to a certain definite strength no tapping of the bell can take place.

At Station No. 6 the positive current passes through the relay *R* and primary of transformer, but owing to the relay being negatively polarized, this armature is not drawn up and everything in this station is left in its normally quiet condition. Station No. 7, it will be observed, contains no closed path from the tip wire to earth. The same being true of Station No. 8.

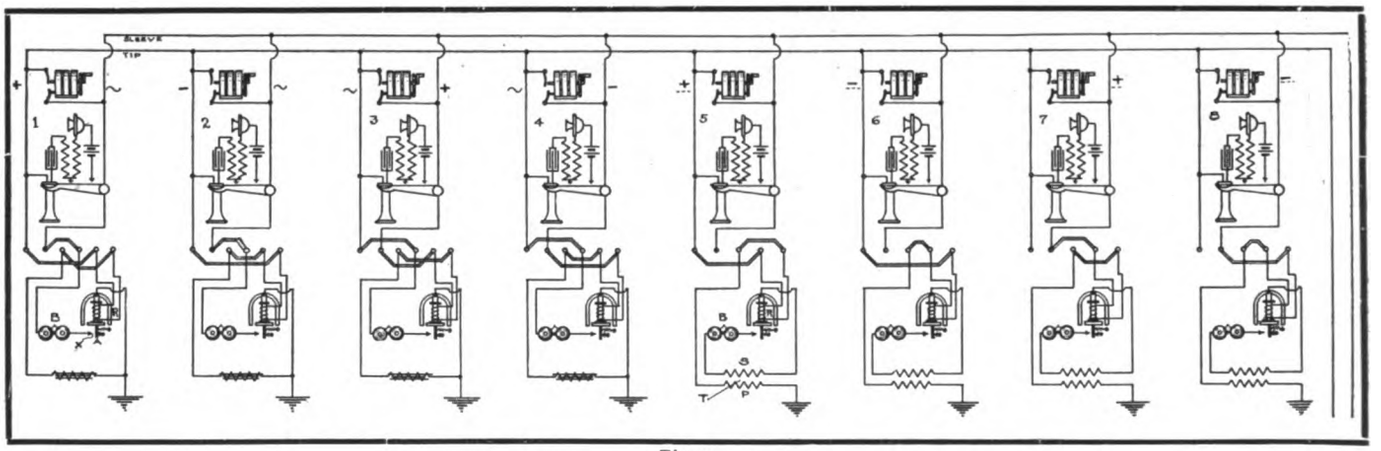

Fig. 9.

Now upon projecting a negative current over the tip side of the line, and an alternating current over the sleeve side, it will be observed that the bell at Station No. 2 will be actuated. Thus, stations Nos. 1 and 2 are operated by projecting either a positive or negative current over the tip side of the line, while an alternating current is projected over the sleeve side. Stations Nos. 3 and 4 are also actuated by a positive and negative current, but in this case these currents are projected over the sleeve side of the line, while the alternating current is placed upon the tip wire.

Now, referring to Station No. 5, we are required to project a peculiar character of current over the tip line wire. That is, the current must possess the property of drawing up the armature of relay R, and also of inducing a current in the secondary winding of the transformer *T*. The act of drawing up the armature of the relay and closing the bell circuit, permitting the induced secondary currents to actuate the polarized ringer. The current required for accomplishing this, as was explained before, is of a pulsating character, and in the present instance, the positive current is broken into bits, so to speak, and projected over the line wire.

As respects the effect of this pulsating current upon the remaining stations along the line, the relay in station No. 1 draws up its armature, owing to its being responsive to a plus current. But inasmuch as there is no current upon the sleeve side of the

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line, the signal bell remains quiet. This is also true of Station 2, in which the relay does not draw up its armature. At stations Nos. 3 and 4 no flow of current takes place to earth, while at Station No. 6 the relay is of the negative responsive sign and therefore not attracted. At stations 7 and 8 the tip circuit stands open. It will be observed that if a negative pulsating current is projected over the sleeve wire, Station No. 6 is signaled. And, again, if we project either a positive or negative pulsating current over the sleeve wire, stations 7 and 8 are respectively signaled.

(To be continued.)

A Wireless Method of Telephone Transmission

By Arthur Kneisel.

WHETHER or no wireless telegraphy will ever become a commercial success is a question which it is impossible to decide. Numerous suggestions and discoveries have been made, which while not entirely solving the problem, yet indicate certain possibilities. In the accompanying illustration a system relying upon inductive principles is described.

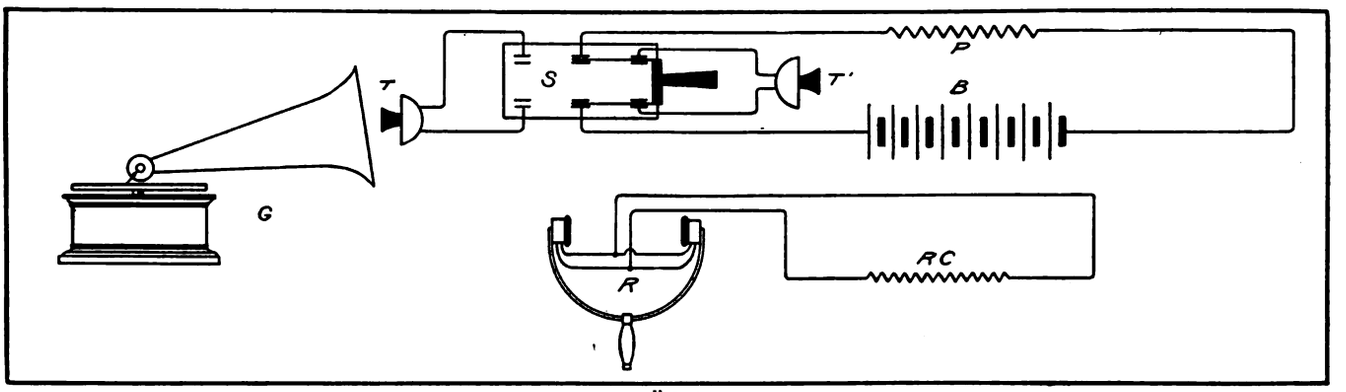

Fig. 2.

If the transmitter *T* (Fig. 1) is spoken into, thus varying the current in the primary circuit *A*, a corresponding variation will result in the field of force of the coil *C*, and this will in turn cause a current of varying strength to be induced in the circuit

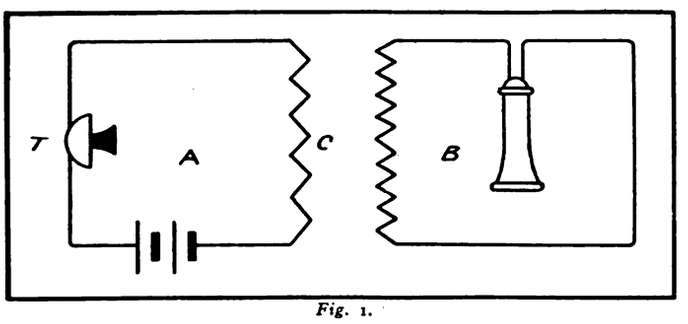

Fig. 1.

B, even if *B* is not wound on the same core and is quite a distance from *C*. Fig. 2 shows the circuits used. *B* represents a storage battery; *S* a double pole, double throw switch; *T* a transmitter fastened in the mouth of a phonograph horn *G*; T^1 a transmitter

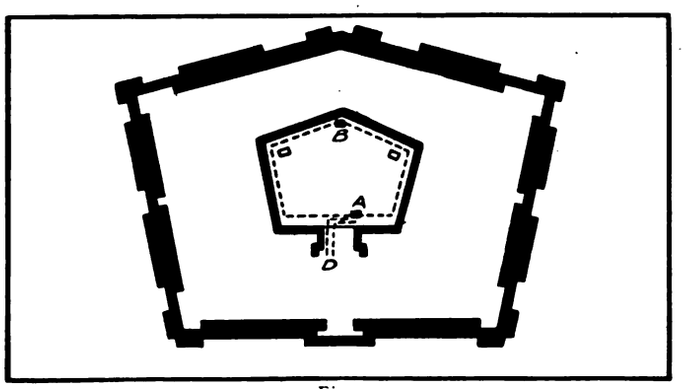

Fig. 3.

left free to be used by the operator in talking. *P* represents the primary of the circuit. In one exhibit of this system the primary circuit *P*, consisting of eight turns of rubber covered No. 0 copper wire, was buried about two feet in the earth around the edge of a court, as shown (by dash line) in Fig. 3. *A* and *B* were junction boxes to facilitate the making of alterations in the primary circuits during the various tests. The operator's booth was at *D*.

The receiving part of the apparatus consisted of a coil, *R C*, of No. 22 silk and cotton covered wire, connected to two watch-case receivers (in parallel), which were fastened to a suitable support (Fig. 4) to enable one to hold the apparatus.

As soon as the receiver coil *R C* is brought into the magnetic field of the primary it acts as the secondary of an induction coil and faithfully reproduces any sounds, such as speech or music, impinged upon the transmitters *T T*. The position in which these coils were held made some difference in the results obtained at the receivers, the best being obtained when the plane of the coil was

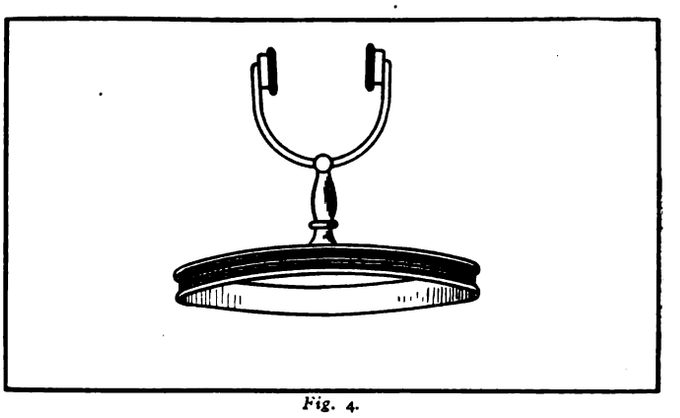

Fig. 4.

held parallel to the earth. In the beginning sixteen cells were used, necessitating the use of water-cooled transmitters, and gave but moderate results. An ammeter introduced in the battery circuit showed that music taken up by the transmitter *T* caused a fluctuation in the current considerably less than the entire amount of current used. After several attempts to obtain a greater fluctuation the number of cells was reduced to five and ordinary switchboard transmitters substituted for the water jacketed ones. These gave good results.

While this contrivance is at present more of a curiosity than a device of commercial value it has some promising features. With a multiple contact transmitter, with which more battery can be used and a greater variation in current obtained, no doubt the range of the system can be greatly increased.

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IN THE OPERATING FIELD.

UNITED STATES TELEPHONE COMPANY ISSUES FINANCIAL STATEMENT FOR MONTH OF MAY.

THE May returns of the United States Telephone Company have been made public. No month since the company has been doing business shows such large gross receipts as are contained in the report just at hand. The gross earnings were $41,136.18. The next largest month was in March, 1905, when the gross receipts were $40,445.87. The net earnings this May equaled $15,371.40. The net returns for this month are not so great as those in March owing to higher operating expenses. The per cent. of operating to gross receipts was 62.3; in March the per cent. was only 59.7. The surplus for the month amounts to $6,152.81, which is more than usual.

ALLIANCE WITH BELL CAUSES LOSS OF BUSINESS TO NEW YORK INDEPENDENT COMPANY.

THE Cortland, N. Y., Home Telephone Company, which is now controlled by the Bell, is losing a great amount of its business.

When the Home company was started assurances were made that the rates would be permanent. By this promise a great deal of business was secured and in a short time the Bell was practically out of business. Things went on very smoothly for about two years with the business of the new company gradually increasing. At this time the Bell secured control of the Home company although the business continues to be run by the Home company. A new building was erected and new switchboards installed. As a result the rate for business instruments has been increased from $24 to $30 per year and for residences from $12 to $15 and $18.

Within the last fifteen days it is stated that orders to take out over 100 residence telephones have been received at headquarters.

INDEPENDENT COMPANY APPLIES FOR FRANCHISE IN MILWAUKEE.

THE West Shore Telegraph and Telephone Company has submitted its application for a franchise in Milwaukee, Wis., to the judiciary committee of the Common Council. It will be laid before the council at its next meeting. It is stated that Farnsworth, Bill & Company, of Chicago, directors in the Nassau Bond Company of New York, and other parties having had experience in the construction of telephone exchanges in Illinois and Wisconsin, are back of the new company.

It will connect with the Independent exchanges of the State for long distance service and promises a reduction of at least 25 per cent. in the present rates for telephones. No charge will be made until the new system has 5,000 subscribers. An underground system will be installed for 25,000 instruments. There is said to be $2,000,000 back of the undertaking.

OUTING GIVEN TO OPERATORS OF INDEPENDENT INDIANAPOLIS COMPANIES.

ABOUT 250 telephone girls, employes of the Indianapolis Telephone and the New Long Distance Telephone Companies, recently had an enjoyable picnic at Broad Ripple Park, Indianapolis, Ind. About half of the number, the night operators, were at the park in the afternoon, and relieved the older girls in the company's employ at night.

H. C. Goldrick took care of the girls after leaving the company's offices on Meridian street, and did much to make the event a success. All entered into the spirit of the event from the time they landed at Broad Ripple, and an enjoyable time was spent by all.

H. B. Sale, vice-president and general manager of the company, chaperoned the party, and other heads of the local and long distance departments were in evidence. Though the girls made up the bulk of the outing crowd, the picnic was a treat to the whole company, and all took part.

Every attraction on the ground was thrown open to the operators. Coupon tickets admitting the bearer were distributed. Dinner and supper were served on the grounds. This was followed by a ride on the steamer "Sunshine," and later a group photograph was taken.

The Broad Ripple cars chartered for the occasion were lavishly decorated with banners and flags, and this, added to the cheering and singing of the operators carried the news to the Indianapolis public along the line that the "girls of the I. T. Company" were out for a picnic.

THE CENTRAL UNION HAS TO RESORT TO PUBLISHING ITS OWN NEWSPAPER.

AS a result of not being able to get any of the Indiana newspapers to publish anything in its favor unless under the head of a paid article, the Central Union Telephone Company has issued a paper of its own, which is being circulated in the northern half of the State. This publication is quite boastful of the progress made by the company, and also of future plans for conquest.

STATISTICS RELATIVE TO THE BUSINESS OF THE NATIONAL TEL. CO. OF GREAT BRITAIN.

THE National Telephone Company of England through its general manager, W. E. L. Gaine, at a recent meeting stated that at the end of last March, the company had 1,139 exchanges, 320,017 subscribers' telephones and 5,365 public call offices. Mr. Gaine then gave the following interesting statistics:

Messages, per annum, 995,000,000; miles of wire, 683,000; underground mileage, 439,000; capital expenditure (1904), $54,200,000; gross revenue (yearly), $10,090,000 ;reserve fund, $8,000,000; royalties paid to postoffice, $9,240,000.

AN ORIGINAL METHOD OF DAILY LINE TESTING.

By H. D. Addie.

WHEN we tested our lines the old and usual way, we were being continually asked by quite a number of our patrons our reasons for so doing; and when they received the explanation, the most of these "quizzers" didn't act as if they appreciated the extra effort being made for the betterment of their service; nor did all the "kickers" stop at asking why. Some of them gave positive orders to not test their lines daily, stating that they would let us know when their lines were out of order; and then just so surely as we did as they requested, sooner or later, some of these same persons would inform us that his line had been out of order for two or three weeks (when the operator positively knew that they had used the line about as much as usual). As a result, knowing that we could not give up the testing of the different lines, and for our self-protection, as well as for the good of the service for our subscribers, we devised a little different system of doing this work. See the sample page

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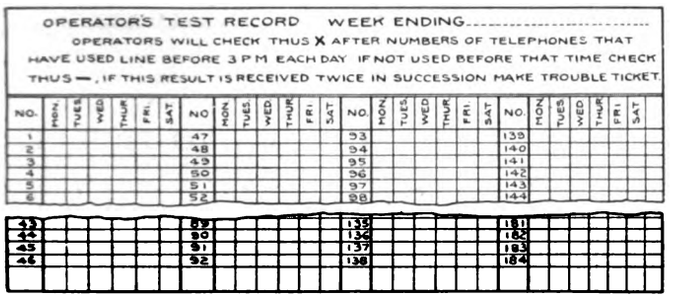
shown. Each operator is furnished with a little "tab" gotten up like the illustration. Each operator is required to make a cross mark after each number, using the line before 3 P. M. If line has not been used before this time, the operator then makes a call on the line. If she receives no response, a dash mark is made after the line number. If the line is not used the second day, the operator makes a trouble ticket for the line. By this


OPERATOR'S TEST RECORD WEEK ENDING.....

OPERATORS WILL CHECK THUS X AFTER NUMBERS OF TELEPHONES THAT HAVE USED LINE BEFORE 3 P M EACH DAY IF NOT USED BEFORE THAT TIME CHECK THUS —, IF THIS RESULT IS RECEIVED TWICE IN SUCCESSION MAKE TROUBLE TICKET.

NO.	MON.	TUES.	WED.	THUR.	FRI.	SAT.	NO.	MON.	TUES.	WED.	THUR.	FRI.	SAT.	NO.	MON.	TUES.	WED.	THUR.	FRI.	SAT.	NO.	MON.	TUES.	WED.	THUR.	FRI.	SAT.
1							47							93							139						
2							48							94							140						
3							49							95							141						
4							50							96							142						
5							51							97							143						
6							52							98							144						
43							89							135							181						
44							90							136							182						
45							91							137							183						
46							92							138							184						

method, no matter what is said by the subscriber about line being out of order for a long time, it can be shown by the test record that, (providing the trouble is kept caught up as it should be) the line has not been out of order for more than two days. Since we commenced this way of handling our "testing," we have had very little trouble with complaints from subscribers, and have received considerable commendation.

NEW EXCHANGE OF PITTSBURG AND ALLEGHENY TEL. CO. AT KNOXVILLE, PA.

AT Knoxville, a borough lying just south of the city of Pittsburg, the Pittsburg & Allegheny Telephone Company has erected a modern exchange. The building is three stories high, including the basement, and is designed for a local exchange equipment of three thousand lines, and a long distance equipment of twenty-eight switchboard positions, together with all the other accessories. The local equipment was put in operation on the 15th of July, takes care of that broad territory known as the Hill Tops. This territory includes the boroughs of Mt. Oliver, Knoxville, Montooth, Beltzhoover, West Liberty, and several wards of Pittsburg's residential section on the south side of the Monongahela River, more commonly known as Allentown, Mt. Washington and Duquesne Heights; in all the territory covers about nineteen square miles.

The lot upon which the building is placed has a frontage of 50 feet on Orchard street and 100 feet on Georgia avenue, of which the building occupies 30 feet by 70 feet. The building is substantially constructed of brick, iron and stone, and presents a handsome appearance. The first floor will be occupied as a general office, private office, space for public booths, terminal room containing both local and long distance frames, relay racks, power apparatus, long distance wire chief's private quarters, battery room and stock room. On the second floor, the local exchange equipment will be placed, occupying the front, while 16 positions of the long distance switchboard will be placed in the rear. This floor also has spacious quarters for the comfort of the operators, including dining, recreation, locker and retiring rooms.

The local board has an immediate equipment of 600 lines, in three sections, with a total of nine positions. Of these, the second and third are trunk positions. The ninth position is blank.

The board is equipped with a complete multiple; three-wire cord circuits, three-wire line circuits, together with selective ringing apparatus for four party lines. The storage battery is 48 volts, and the machinery is all of the Holtzer-Cabot type.

The adoption of a 48-volt battery was due mainly to the fact that in the same building the company's long distance office was to be placed, the one battery serving both local and long distance lines.

The woodwork of the switchboard is mahogany from selected San Domingo stock, given a natural finish, and rubbed to a velvet surface. The stile strips are mahogany with the multiple groups of 100, numbered by means of small octagonal ivory buttons inlaid with a perfect joint in the mahogany strip. Not a particle of nickelplated surface shows on the face of the board, everything is either wood, leather, brass, hard rubber or black metal finish. The rear enclosing panels are 10 inches in width, which are light and handy to remove.

The entire local equipment was installed by the Dean Electric Co., of Elyria, Ohio.

The officers of the Pittsburg & Allegheny Telephone Company are: J. G. Splane, president; John S. Weller, vice-president and general counsel; S. H. Browne, general manager; R. C. Hall, treasurer, and T. G. Davis, secretary and assistant treasurer.

PICNIC FOR EMPLOYES OF CUYAHOGA TELEPHONE COMPANY.

THE first annual picnic of the employes of the Cuyahoga Telephone Company of Cleveland is scheduled for Luna Park Saturday, August 5. The festivities will commence at noon and will last until the park closes in the evening. A general committee of the employes is busy working up the details for the big gathering. The schedule is to be so arranged that every one of the 600 employes will be present for a part of the day, either in the afternoon or evening. The general offices will be closed for the afternoon. The programme of events will be an elaborate one and will include nearly everything from a peanut race to one of President Dickson's characteristic speeches. The committee on sports has arranged for a baseball game, wrestling match, tug of war, fat man's race and other enjoyable features.

The committees in charge are as follows: General committee—O. F. French, W. B. Woodbury, F. B. Schrader and J. P. Boylan. Committee for invitations, press and advertising—W. B. Woodbury, H. G. Hall, F. D. Allyn, F. J. Sullivan and G. H. Smith. Reception committee—F. S. Dickson, J. B. Hoge, R. W. Judd, W. L. Cary, Jr., B. H. Lang, M. B. Overly, C. Y. McVey, O. F. French, Miss Tuttle, Miss Marshall and Miss Weaver. Committee for entertainment and programme—G. W. Keeley, J. P. Boylan, C. H. Nichols and Isaac Campbell. Committee for sports—F. B. Schrader, D. B. McIntyre, P. C. Davis and R. C. Criswell.

THE BELL TELEPHONE LOSES AT LEBANON, IND.

A REPRESENTATIVE of the Central Union Telephone Company, after working two weeks soliciting the privilege of placing telephones in houses and places of business, with the understanding that there would be no charge until 300 telephones had been installed, finally gave up the task, because the citizens are bitterly opposed to the Bell company's methods. The Independent companies are giving excellent service in and around Lebanon.

CONTRIBUTIONS SOLICITED

THE AMERICAN TELEPHONE JOURNAL is always in the market for crisp, snappy news or technical contributions. Descriptions of ways to do things telephonic, illustrated with sketches, and also descriptions accompanied by photographs are especially acceptable and will be paid for. Literary skill is not essential, but is, of course, appreciated. Send your sketch, photographs, and write the matter as well as you can. It will be dressed up, if necessary. Here is an opportunity for telephone men from engineers down to ground men to increase their incomes. An article cannot be too technical nor too elementary for us to consider. Articles illustrated with photographs are particularly desirable and will be substantially acknowledged.

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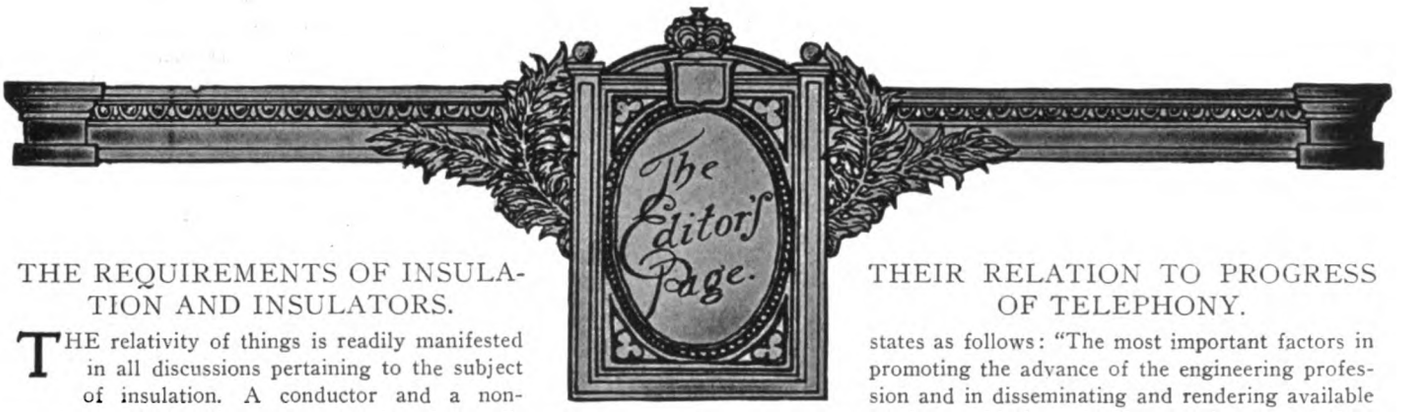

THE REQUIREMENTS OF INSULATION AND INSULATORS.

THE relativity of things is readily manifested in all discussions pertaining to the subject of insulation. A conductor and a non-conductor are merely cases expressing the readiness with which electricity can pursue its path or be resisted. But the non-conductor not only presents an instance of a medium, through which electrical energy cannot readily pass, it exhibits qualities by which the discriminating title of dielectric has been bestowed upon it. In telephone practice the insulator and insulation are items of first importance. By means of the first the telephone line is secured against leakage and such interference as arises due to actual contact with other conductors. By means of the second, inductance in combination with a non-conducting covering is obtained. It is unnecessary to state that it is not a fortunate circumstance that all insulators are dielectrics high or low in the well-known scale. It would be a much better thing for telephony in general, and its future extensions in particular, if an insulation could be provided by which trunk lines would be impermeable to inductive disturbances.

A non-inductive insulation, an insulation composed of such materials that electro magnetic energy could not enter it, would solve one of the greatest problems in speech transmission. An insulation which prevents electricity from getting out, and an insulation which prevents magnetic waves from getting in, seems to properly present the situation.

The difficulty in the achievement of progress of such material value that time and effort are saved is due to the attitude of many of our best scientists to practical propositions. It is not an ignorance of the knowledge required which retards to a large degree much expected advancement, but a neglect or disregard of the immediate necessity involved.

Many of our masters of scientific lore are occupied with purely physical problems, the solution of which would elevate them in the eyes of their confreres. We have greater room for experiment and activity in the purely commercial or technical world. It is a mistake to think that honor or fame is not found here. The combination of the two abilities, the power of scientific analysis and a full appreciation of the needs of practical workers, represents the better type of our savant. Let one of them unravel the intricacies relating to such insulation as is now required, and we predict for such as he a foremost niche in the Hall of Fame.

THE PRACTICAL VALUE OF ORGANIZED TECHNICAL BODIES.

IT is generally admitted that one of the most noteworthy characteristics of Americans is their tendency to join associations. An evidence of this exists in the form of insignias and buttons, watch charms and pins in the possession of hundreds of thousands of our citizens. On the whole, this idea of co-operation as exemplified by the membership list of a vast number of organizations, created and managed for social, material or professional benefits, reaches its highest plane in technical aggregations. It is here, among the trained minds that compose it, that time is spent with serious intent, and the benefits of such meetings become a stepping stone to greater possibilities and achievements in the fields of science of which they represent, perhaps, but a single by-path. President John W. Lieb, of the American Institute of Electrical Engineers, in his presidential address, states as follows: "The most important factors in promoting the advance of the engineering profession and in disseminating and rendering available to the world the valuable experiences and data accumulated by engineers are the professional associations or national engineering societies."

THEIR RELATION TO PROGRESS OF TELEPHONY.

In this respect, while the mutual benefits derived from such associations, seem to be limited to those actually composing the membership, the advantages extend outward in ever widening circles of transmitted knowledge. The student and apprentice constantly feed on such pabulum, and the commercial interests with their busy engineers and workers receive their best guidance and instruction from these sources. In telephonic work the conventions periodically occurring are illustrations of the value of this system. The exchange of opinions and experiences crystallized or otherwise fall upon the richest soil. The art of transmitting speech by electricity has developed into a practice. The theory has been transformed into a host of applications. A thousand and one details of construction now meet with consideration, and the complications arising from unanticipated conditions, with their long and harassing train of consequences, are discussed and well sifted at the great telephone conventions. These, it seems, are one of the most powerful of influences in the progress of practical telephony. In this respect the value of organized technical bodies commands a new attention.

THE TELEPHONE AS A BASIS OF JAPANESE VICTORIES.

THE rigid requirements of warfare have not been neglected by the Japanese. From a physiological standpoint, they are pre-eminent among the pioneers of the world in their care of the soldiers' health. From an electrical standpoint, much of their mility success, and the facility, in some cases, with which they have won it, can only be attributed to the perfect signaling system established by them on the momentous occasions. The United States has recognized the importance of this phase of military activity for many years, and in her engineering corps has established departments whose duties gravitate entirely in this direction. Japan has not lost sight of this object lesson, and when battle is imminent, places every section of her great human fighting machine in touch with the central and guiding intelligence by means of the telephone. From this electrical nerve center, composed of the general and his aide de camp, radiate the orders which govern the manœuvers of the army proper. These orders are transmitted through the telephone lines, which thus transform the great body of men composing the army into one organism.

The battle of Mukden marked an epoch in the history of applied telephony. Examination of the various means employed to insure success discloses the fact that science was the prevailing factor. Both the science of method in general and, the science of modern methods of communication in particular, exercised their dual influences. The utilization of the telephone meant dispatch and precision. It meant intelligent and instantaneous control of the marching forces. It meant that the great military commanders could play their game of chess with destiny, with the lives of thousands of patriots in the balance, without fear of rout or confusion.

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HERBERT LAWS WEBB WAXES INDIGNANT.

To the Editor of THE AMERICAN TELEPHONE JOURNAL:

Sir:—I suppose I ought to feel flattered at being the principal object of one of your sprightly if somewhat illogical editorial articles. Personalities seem to be inseparable from telephone discussions, and all that one can say of yours is that they are cruder than is customary. However, you have sinned even more against accuracy than against good taste, and in the interests of your readers I must ask to be allowed to correct some of the erroneous statements that occur in your article of June 17.

Apparently the writer of the article had not taken the trouble to read my evidence at Ottawa before commenting on it, or he could hardly have so grossly misrepresented my statements of fact and opinion.

My evidence related almost entirely to European telephone conditions. I stated that the state monopoly in telephony which exists in almost all European countries had acted like a blight on the telephone business throughout Europe and was chiefly responsible for the low telephone development in Europe.

I have always advocated giving private enterprise a free hand in telephony, and there was nothing in my evidence contrary to that view. For you to say that I do not know or do not appreciate what I have constantly and consistently advocated is misrepresentation unworthy of any technical journal.

It was also part of my evidence that municipal telephony in Great Britain is a dead issue, and this is a fact. There are only five municipal telephone systems in the whole of Great Britain, and under the present conditions it is obvious that the number will not be increased. Both as examples of telephone engineering and as competitors the municipal systems are failures. They are one and all equipped with inferior and obsolete plants, and they are all smaller and are growing much less rapidly than the systems of the National Telephone Company in the same towns. In Glasgow, notably, the National Company has beaten the municipality to a standstill, the Glasgow National system having nearly double the number of stations claimed by the Glasgow municipal system.

I made no "admitted statement" that "common battery was unknown in England up to the time the national government took hold of the London service." On the contrary, the facts are, and I so stated them, that the National Telephone Company had installed several common battery exchanges some years before the postoffice London system was started.

The statement I did make, which is correct, was that whereas the postoffice London system was equipped with common battery exchanges, the Glasgow municipal system, begun about the same time, was equipped with flat call-wire (or Law system) switchboards.

To attribute any great progress in telephone matters in England to the existence of the municipal systems is to show ignorance of the facts which in a journal devoted exclusively to telephony is most astonishing. All who are conversant with the subject know that the British municipal telephone systems, as regards plant, methods and organization, are based on the practice which obtained from fifteen to twenty years ago. The complete ignorance of modern telephone methods displayed by the promoters of the municipal systems is chiefly responsible for their failure, for undoubtedly there was a great opportunity six years ago to establish effective competitive systems in this country. The opportunity was misused and is now gone.

A closer attention to facts might perhaps deprive you of the opportunity of using picturesque language, but I think such a policy could not fail to make THE AMERICAN TELEPHONE JOURNAL more useful to its readers.

Yours, etc.,

HERBERT LAWS WEBB.

35 Old Queen street, London, S. W., June 30, 1905.

Editor's Note.—Before Mr. Webb's terrifying sarcasm, the Editor of this paper stands in mute humility. There is, however, one palliative to the sting. The "admitted statement" we attributed to the incensed gentleman was not contained in his testimony before the Parliamentary committee. It appeared in an article prepared by Mr. Webb three years ago, at the time the London Postoffice system was building, and reads as follows:

> *"An interesting feature of the London Telephone situation is that the new Post Office exchanges are being equipped throughout on American lines, with common battery switchboards, and that the National Company has already made a start at rebuilding its London system with American battery equipment."*

When, in connection with this extract, it is further to be read in Mr. Webb's article published at the time, that "the Postoffice engineers have been building telephone conduits, a class of underground construction of which London had hitherto been innocent," it is conceivable that no great injustice was done the National Telephone Co. when we declared in the editorial which has aroused Mr. Webb's wrath that: "Under the exclusive control of the National Company the telephone situation was hopeless beyond expression in the British Isles."

We are at all times happy to open our columns to so terse a writer as Mr. Webb, and regret only that he cannot bring himself and his talents into the broad field of the telephone industry, instead of tying himself to the unprogressive interests he now serves.

AN INSTANCE WHERE THE TELEGRAPH FAILED.

QUITE frequently reasons are advanced tending to show that in train dispatching the telegraph instrument is far superior to the telephone. A recent dispatch from Evansville, Ind., cites the following instances from which it is reasonable to suppose that the use of the telephone would have prevented the accident.

"The mistake of a single click in the telegraph key by Louisville & Nashville Operator White at Mt. Vernon sent four souls into eternity in the Upton freight collision. The Evansville dispatcher gave orders for the westbound train to take siding No. 5 at Mt. Vernon.

"The figure '5' in the telegraphic code is three dashes. The operator at Mt. Vernon caught the clicks as two dashes and two dots, the code for the figure '7.' Siding No. 7 is west of Upton. He allowed the train to pass him before he realized his mistake.

"The list of dead will number four, with the life of Fireman John Rold, who was pinned under the debris for five hours, hanging by a thread. The property loss to the railroad will amount to $300,000."

From the above it would appear that the telegraph was not less fallible than the telephone in train dispatching, and that therefore the use of the telephone as an auxiliary, if not as the main factor in transmission of train orders, would be a safeguard.

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The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

COMPANY MUST FURNISH SERVICE ACCORDING TO CHARTER.

Please to give me decisions compelling telephone company to furnish telephone and service according to telephone franchise. K. T. L.

TELEPHONE Company vs. State, 118 Ind., 194; 123 Ind., 113. State vs. Nebraska Telephone Company, 22 N. W., 237. Campbellsville Telephone Company vs. Lebanon Telephone Company, 80 S. W., 1114.

REGULATION BY RAILROAD COMMISSION.

We will be pleased to have you inform us if you are aware of any State where the telephone rates are subject to regulation by the railroad commissioner or anybody appointed for the purpose of governing such matters. We are under the impression that efforts were made in one or two States to have such a law passed, but do not know if these efforts were successful or not. If such laws have been passed we will esteem it a favor if you will advise the best way to obtain copy of the same. G. T.

THE telephone business in Louisiana is under the control of the Railroad Commission. Such is also the case in North Carolina. Copies of the law may be had by writing to the Secretary of State at the respective State capitals.

RESIDENCE SERVICE RATES IN NEW ORLEANS.

AS a further adjustment of the case of the Railroad Commission of Louisiana against the Cumberland Telephone & Telegraph Company, in rates for residence service in the city of New Orleans, the following order was issued by the commission, the order becoming effective July 1, 1905: Ordered, That in the city of New Orleans the rate for direct lines, single party, long distance metallic equipment for telephone service in residences is hereby fixed and established at $4.50 per month, subject to the usual discount of fifty cents per month when paid quarterly in advance. All rates in conflict with this order are canceled

UNIVERSITY SUES COMPANY.

THE Leland University, New Orleans, expects to get $2,500 damages from the Cumberland Telephone & Telegraph Company. In a suit filed recently in the Civil Court, the former claims that during the vacation of 1904, in the month of June, the employees of the defendant company entered the grounds of the university and dug holes and put in several telephone poles. Petitioner avers that this was done without the knowledge of any of the officials of the university. Owing to this, the officials of the university claim that they have been damaged to the above sum, since the peace and quiet of the university was disturbed, and further, owing to the fact that the telephone company now refuses to remove the poles they put up on the premises that belong to the university. The petitioner avers that defendant company persists in maintaining control of the ground on which its poles are erected, and asks for judgment with costs.

FURNISHING SUITABLE TOOLS AND APPLIANCES.

THE United Electric, Gas and Power Company, of Los Angeles, Cal., an electric light company, furnished its linemen with several pike poles, of the character and construction customarily used in bracing electric light poles while removing them. One of these pike poles had become dull at the point and unfit for use with safety. A lineman, who was one of a gang of four men, had been directed to strip the wires from and remove certain electric light poles, which were supposed to have become unfit for use. While the lineman was on an electric light pole, stripping the wires, one of the other workmen in the gang picked up and used the blunt pike pole, which did not grip the electric light pole so as to properly hold it, and in consequence it fell, seriously injuring the lineman. The court held that the defendant company had properly fulfilled its duty of furnishing suitable tools and appliances and that the injury was in no way the result of its negligence. The court considered that it was as much the duty of the employee as of the company to have the pike pole sharpened and repaired. The injury was the result of the negligence of the fellow workman, who picked up and used the defective pole without observing its defect. Town vs. United Electric Gas & Power Co., 81 Pac. 8124.

MARYLAND TELEPHONE COMPANY CAN FURNISH LIGHTS.

THE Court of Appeals of Maryland has delivered an opinion, affirming the decision in the Circuit Court, in the case of Alexander Brown against the Maryland Telephone & Telegraph Company of Baltimore. By the decision the telephone company is sustained in its claim of the power to furnish electric light to the city of Baltimore under such regulations as the Mayor and City Council may prescribe. The single question presented by the appeal was whether or no the Maryland Telephone Company has the power under its charter to do an electric lighting bsuiness in Baltimore.

TELEPHONE MANAGER IN ALLEGED CONTEMPT.

BENCH warrants have been issued for A. J. Murray, manager of the Baraboo Telephone Company, and four men who were jurors at the last term of the Circuit Court in Baraboo, Wis. During the trial of the damage case of Slade vs. The Baraboo Telephone Company, the manager of the telephone company invited one of the jurors to inspect the pole which fell upon a boy, causing death and resulting in the suit for damages. Three of the jurors, it is stated, visited the scene of the accident during the trial contrary to the instructions of the judge. As a result the judge has granted a new trial.

ERECTION OF POLES MUST BE CONFINED TO HIGHWAYS.

WHERE a Telephone and Telegraph Company did not confine the erection of its poles to the public highway, but placed some of them on a person's land without his authority, that person is entitled to have such poles removed. Purdam vs. Cumberland Telephone & Telegraph Co., 87 S. W. 1071.

LINE CONTRACTS.

THE Western Union Telegraph Company brought suit in the Federal Circuit Court of the Northern District of Illinois to have certain right of way contracts it held with certain railroads declared in force and to have them performed by the railroad companies in accordance with its terms. The various right of way contracts had been consolidated into an operating contract, which did not attempt to annihilate or merge the various underlying agreements, further than to provide for a practical operating agreement for a period of twenty-five years and thereafter until terminated by one year's notice by their party. Such notice was duly given and the court in granting the relief sought by the Telegraph Company, held that the termination of the operating contract did not deprive the telegraph company of its rights under the underlying agreement. Western Union Telegraph Co. vs. Pittsburg Railway Co. 137 Fed. 435.

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WANTED—Man used to wire chief's test table, testing lines and handling men. Also, switchboard construction men; men used to Kellogg system preferred. Give experience, references and salary wanted. Address Box 424, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 424

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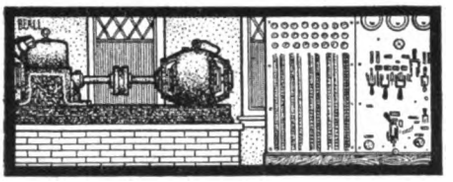
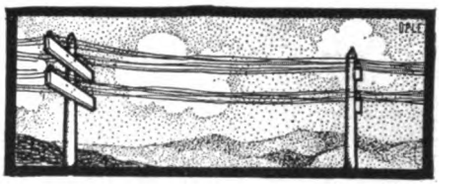


QUERIES

Questions on any subject relating to telephony will be answered on this page.



RINGING MACHINE.—(586.)

Please illustrate how a ringing machine is used to give tone and busy tests. Are there separate windings on the armature for each circuit?

M. N. G.

The tone and busy tests used on common battery multiple switchboards are derived from an interrupter which is a mere attachment to the ringing machine, the latter simply serving to drive it. Fig. 586a shows the most common form of "busy back" and tone test interrupter. The high speed interrupter which gives the high note or hum is attached to the ringing machine shaft. It consists of two metal discs, one of which has insulation blocks sets in its circumference, the other being plain. A circuit from the exchange battery includes the primary of a tone test transformer and this high speed interrupter. The interrupted current in this primary sets up an induced current in the secondary which is sometimes used as a special test on the multiple board, the operator receiving a tone instead of the usual busy click.

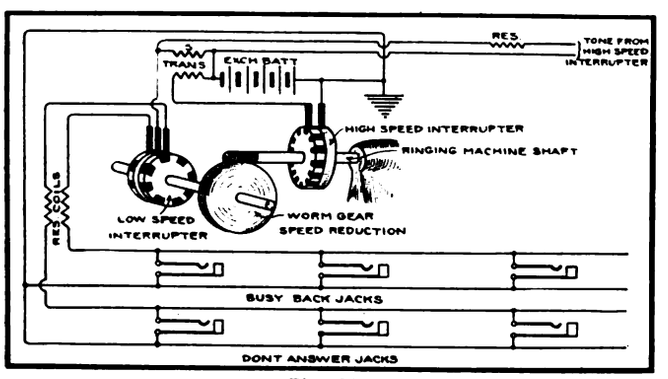


Fig. 586A.

For *busy back* and *don't answer* purposes, on incoming trunk positions, where the operator is not provided with apparatus and circuits which admit of her talking back through the trunk circuit, another interrupter of slow speed is used to break up this tone into definite signals. A worm gear serves to reduce the speed of the secondary shaft upon which is mounted three metal discs. The middle one is plain, while the two outside ones have insulation blocks set in their circumference, the three being metallically connected. The secondary winding of the tone test transformer is connected to this middle disc by means of a brush and two other brushes, resting on the outside discs, connect through resistances to the tip of the busy back and don't answer jacks. The sleeves of these jacks form a return circuit through the exchange battery to the other side of the tone test transformer. The busy back tone is interrupted by uniformly spaced insulations, while the don't answer tone is made by an uneven spacing of the insulations.

The reason for connecting the secondary of the tone test transformer to battery is shown in Fig. 586b. Here a trunk plug is shown inserted in a don't answer jack. The don't answer tone is put on to the trunk and the local subscriber, who originated the call, is notified by it that the called for subscriber does not answer. The former will hang up, thus starting the usual sequence of trunk disconnect signals which will serve to clear the circuits. In order to clear the trunk circuits rapidly and prevent the possibility of a subscriber keeping the circuits tied up by not interrupting the busy signals, the battery *B* is connected so that a circuit will be established through the secondary of the tone test transformer, low speed interrupters, don't answer and busy back jacks, through the tip side of a connected trunk, tip relay of a connected local cord circuit, to ground and back to battery *B*. The low speed interrupter will thus open and close the battery circuit as well as the tone test circuit and the supervisory relay *C* will be operated and flash the supervisory lamp *L*. The local operator, seeing this signal can notify the calling subscriber the reason for not completing the connection and pull down her cord circuit, liberating the trunk.

RULES FOR TELEPHONE AND POWER WIRES.—(587.)

First. What constitutes a contact on a telephone or electric light pole, for instance; is one wire or a cable consisting of fifty wires more or less a contact, or can a cable be considered as fifty contacts more or less? Would you consider a cross arm containing ten wires more or less a contact for each wire or one contact only?

Second. Would you consider a telephone company carrying foreign electric light wires ranging from 110 to 4,500 volts of alternating currents giving a greater concession to an electric light company, than if they were carrying a like number of contacts (as interpreted by question one) of 20 volt central energy telephone wires?

Third. Where electric light wires ranging from 2,000 to 4,500 volts are placed beneath telephone wires, what clearance should there be at pole between wires for repairman to pass through?

Fourth. Is it not a safe rule and one generally adopted to keep all high voltage wires, transformers and electric light lightning arresters off all telephone poles except where same are placed above telephone wires at a sufficient height to obviate the danger of accidents and induction?

Fifth. What distance should there be on direct cross-overs between telephone and electric light wires, where the voltage on electric light wires ranges from 2,000 to 4,500 volts, and if theoretically there is no induction from one direct cross-over at a given distance, should there be from a number of such conditions?

G. H. F.

1st. We assume that you use the term *contact* in the sense of an attachment to, or a fixture on, a pole. On this basis one wire would be one contact and one cable would be one contact—irrespective of the number of conductors within the cable.

2nd. For a given number of contacts the electric light wires are a greater concession than telephone wires, because the former are of greater weight and consequently greater burden to the pole line, and because they introduce inductive telephone disturbances and the hazard of crosses between the two classes of wires.

3rd. Not less than twenty-six inches—see "National Electrical Code," Rule No. 64b. and No. 12h.

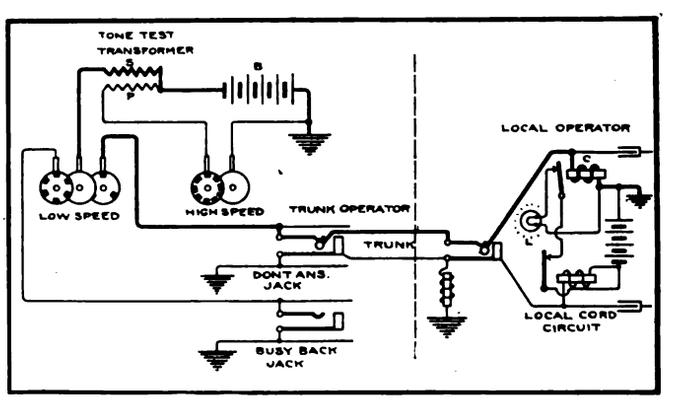


Fig. 586B.

4th. Yes. It should be more generally adopted than at present.

5th. If there is a joint pole at the cross-over, not less than three feet. If there is not a joint pole, there should be space enough so that broken wires from the upper line cannot dangle into wires on the lower line; if this condition cannot be fulfilled there should be a grounded guard screen between the lines. See "National Electrical Code," Rule No. 12A.

There should be no induction from one or more cross-overs if the lines are free from trouble and in normal condition.

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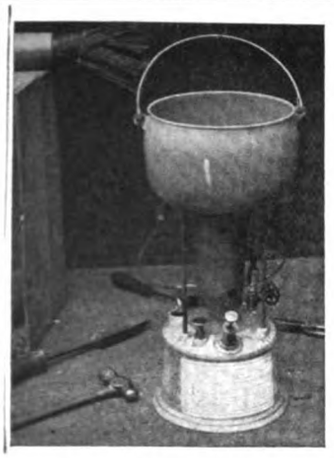

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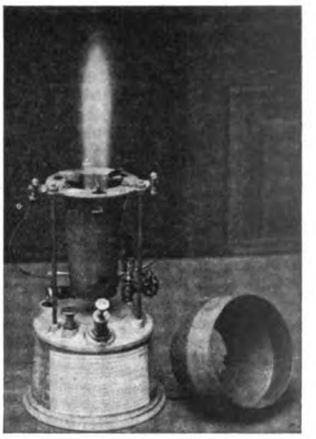

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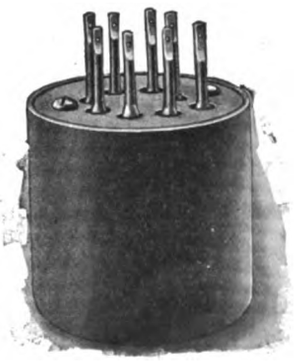

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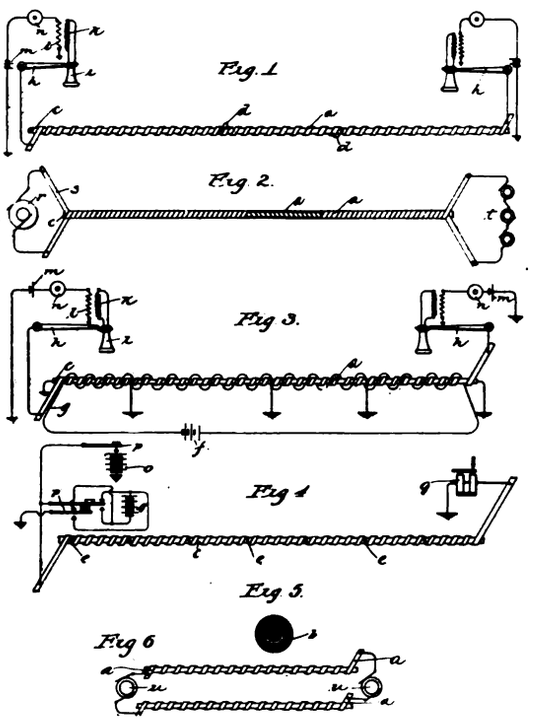
TELEPHONE PATENTS

PROPAGATING TELEPHONE WAVES.

Dugald C. Jackson, Madison Wisconsin, patents (No. 789,738; dated May 16, 1905; filed September 23, 1901; serial No. 76,248) an invention which relates to circuits for propagating wave forms. The important feature of this invention, is the preservation of the wave form by means of a helical conductor, through which attenuation is avoided.

The decay or distortion, due to the influence of static capacity, is reduced to a minimum, by the employment of inductance according to known laws. This inductance is created within the wire, acting as a telephonic conductor, by constructing the conductor itself in the form of a continuous coil. Lines of force



within the conductor develop inductance, and limit or remove the effects of capacity. The inventor uses a core for the wire spiral, consisting of very fine wires of soft iron. Where a magnetic core is employed, the subdivision thereof, into wires or strands, is for the avoidance of eddy currents, and the iron is made soft magnetically in order to avoid serious waste of energy through the effects of hysterisis.

Fig. 1 shows a grounded circuit with the spiral conductor in use as described, and Fig. 2 shows a complete metallic circuit with both conductors acting as producers of inductance. The core is indicated at *c* and the conductors at *a*. The letter *d* shows jumpers or connectors in service, which make the core act also as a conductor as well as the spiral, thus cutting down the resistance of the circuit. This invention is of great service in telegraphy as well as for the preservation of telephone currents.

In Figs. 3, 4, 5 and 6 are shown respectively a supplemental circuit in association with the core of the spiral; a modification where the spiral is provided with a magnetic core composed of magnetically separated sections; a cross sectional view of the commercial cable representing the crystallization of this invention and finally a view of a metallic circuit with separate spiral conductors.

A TELEPHONE EXCHANGE SYSTEM.

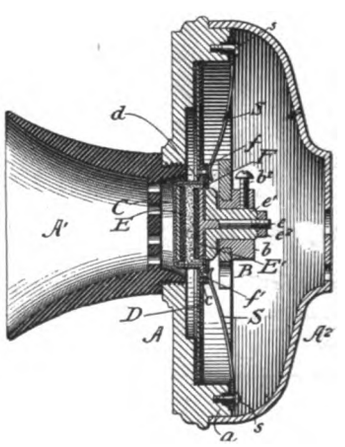
Harry G. Webster, Chicago, Ill., patents (No. 793,972, dated July 4, 1905; filed March 25, 1903; serial No. 149,559, and assigned by mesne assignment to Stromber-Carlson Telephone Mfg. Co., Rochester, N. Y.) a telephone exchange system. This invention is adapted to the use of the energy of the central exchange, for the purposes of supplying talking and signaling currents to the subscribers' substation apparatus. The means are provided in this system by which the potential of the test contact of an operator's plug is made only slightly different from that of the test thimble of a busy line; before application of the test contact in making a busy test. The desired potential is obtained by means of a resistance interposed between the poles of the source of electrical energy, and to some intermediate point in which the testing tip contact is connected when the test is being made.

TRANSMITTER.

William E. Harkness, Elyria, Ohio; patents (No. 793,928; dated July 4, 1905; filed March 13, 1904; serial No. 198,785; and assigns by mesne assignment to the Dean Electric Co., Elyria, Ohio); a telephone transmitter.

The purpose of this invention is a transmitter of simple construction, easy assembling and efficient operation. The inventor claims a superiority in that his device does not suffer from the drawbacks he points out as existing in other transmitters. The features of interest are centered in the arrangement of the carbon and the contact between the diaphragm and movable electrode.

This invention consists of a transmitter in which the carbon receiving chamber rests against and vibrates with the main dia-



phragm. The diaphragm as illustrated, shows an opening in which the cup is set with its flange resting upon the inner face of the diaphragm. The cup becomes by this construction part of the diaphragm and the carbon it contains by constant agitation remains unpacked.

The direct exposure of this carbon containing chamber to the influence of air waves presents a unique feature in transmitter construction particularly in the way of simplicity and effectiveness. In the sketch the essential features of construction are shown. The chamber with its spring attachments and its position with respect to the diaphragm *D* is fully illustrated in sectional view.

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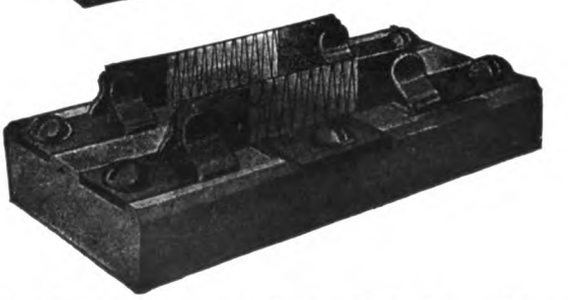
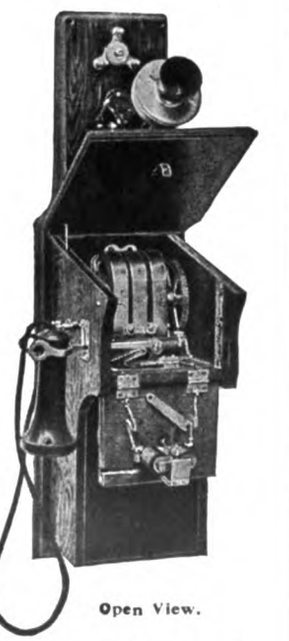
If you order Central "Leader Junior" Telephones you will be buying now what you are sure to buy ten years from to-day.

Closed View.

CENTRAL FUSE BLOCK

LIGHTNING ARRESTERS





Open View.

Sample Series—4 Bar or 5 Bar Bridging Leader Junior Telephone shipped to any responsible party in the United States on 30 days' trial prepaid freight.

Sample Fuse Block as above sent free on request to any one mentioning this ad.

CENTRAL TELEPHONE & ELECTRIC CO.

2135 Lucas Ave., St. Louis, U. S. A.

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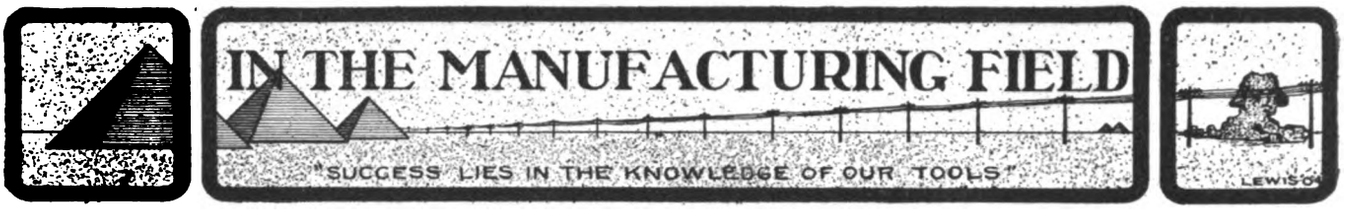
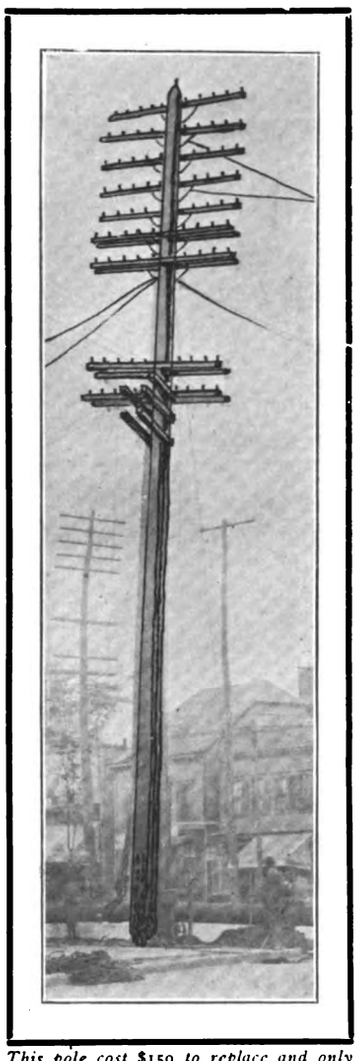


A WOOD PRESERVATIVE.

THE subject of the preservation of poles by the application of good preservatives is one which merits the attention of all telephone companies. Among the many fluids recommended for this purpose is the Avenarius Carbolineum wood preservative, manufactured by the Carbolineum Wood Preserving Company of Milwaukee, Wis. This is a solution which, when applied to wood of any description under conditions of the most unfavorable character, will act as a powerful antiseptic and waterproofing element. The claim is made that it can save wood from the natural results of dampness, the attacks of insect and animal life and the ravages of fungoid growths. When utilized for the protection of seasoned wood the best results are obtainable.



This pole cost $150 to replace and only in service five years.

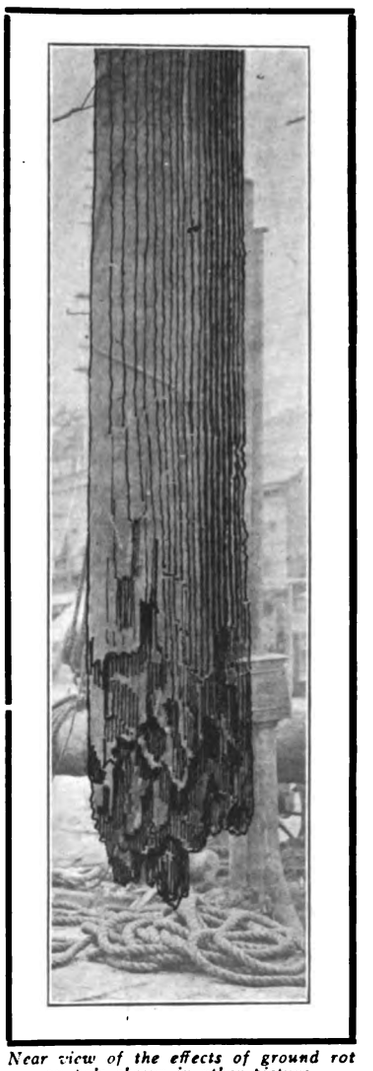
This solution is ready for immediate use, and when applied simply calls for the employment of a brush or dipping vat. It is strongly recommended for the coating of fences, wooden buildings, sheds, shingles and beams.

When applied it forms a durable nut brown stain, which not only acts in the capacity of a paint and costs less, but prevents, through its protection against humidity, the tendency to warping. Excellent results are obtained by its application to brick or porous stone, or in any case where deterioration due to moisture is to be effectively checked. No risks are attendant upon its use, as it is exempt from either carbolic or any other free acid; it contains no volatile components and its boiling point is 557 degrees Fahrenheit; thus not increasing the degree of inflammability of the wood when applied.

The accompanying illustrations show the condition of a pole unprotected against the deleterious influence of moisture and ground rot. The cost to the company of negativing these conditions was from the standpoint of new poles and the attendant repairs about $150. This pole, useful only for five years without protection, would, if preserved against corruption, have lasted more than double that period of time.

THE DEAN ELECTRIC COMPANY, Elyria, Ohio, has received an order from the Adirondack Telephone Company, of Malone, N. Y., for a complete common battery multiple switchboard of 1,200 lines ultimate capacity, to be fitted with the new Dean four-party selective ringing equipment, including individual indicating ringing keys in each cord circuit. The present installation will consist of two three-position switchboard sections and a complete power plant. It is interesting to note in this connection that all of the Dean contracts for central battery switchboards have included complete four-party line equipments.

THE CENTURY TELEPHONE CONSTRUCTION COMPANY, Buffalo, New York, has recently shipped to the Frontier Telephone Company, Buffalo, N. Y., a number of common battery private branch exchange switchboards, and a complete common battery four-party selective switchboard equipment for Blasdel, N. Y. This company has also entered orders for switchboards for Hamburg Telephone Company, Hamburg, N. Y.; Fairport Telephone Company, Despatch, N. Y.; Livingston County Telephone Company, Moscow, N. Y., and a complete common battery central office equipment for East Aurora Telephone Company, East Aurora, N. Y.



Near view of the effects of ground rot on pole shown in other picture.

FRANK B. COOK, Chicago, Ill., has been obliged to increase the capacity of his factory on account of the largely increased amount of business secured. He says that if it had not been for this increased capacity he would have been obliged to refuse orders, as the factory has been pushed to its limit for the last eight months, in spite of the fact that it has been run overtime and nights. The demand for Cook's latest self-soldering protector, No. 8, has been largely responsible for this condition, and the factory has also been taxed to its capacity for Cook's pole cable terminals, junction boxes, guy clamps and construction material. Some of the orders for the No. 8 equipment which Cook has received recently are as follows: United Telephone and Telegraph Company, Altoona, Pa., 1,800 pairs; Dean Electric Company, for Racine, Wis., 1,720 pairs; Dean Electric Company, for Dunkirk, N. Y., 660 pairs; Dean Electric Company, for Niagara County Home Telephone Company, of Niagara Falls, N. Y., 880 pairs; Dane County Telephone Company, Madison, Wis., 1,600 pairs; Stromberg-Carlson Telephone Manufacturing Company, for the following exchanges: Twin City Telephone

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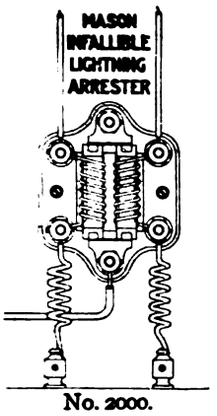

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Lightning Eliminated!!

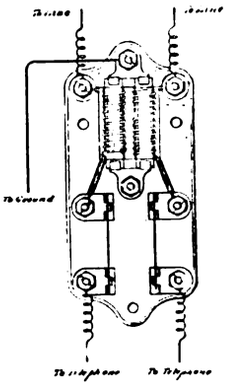
There has never been known a case where lightning has passed

THE "MASON"

Theoretically correct — remarkably efficient — a veritable barrier to lightning. Ask for Bulletin 38-S and prices.

Ewing-Merkle Electric Company

ST. LOUIS, MO.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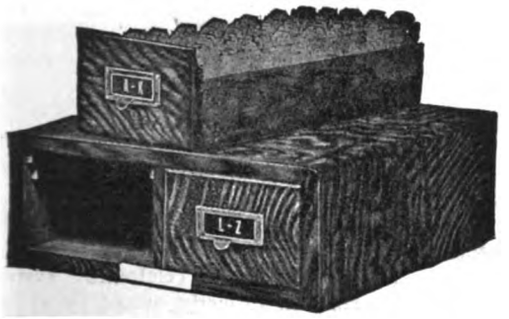

CARD INDEX SYSTEM

ESPECIALLY DESIGNED FOR

TELEPHONE EXCHANGES

The simplest style of record from which to trace every line from 'Phone to Switchboard. Invaluable for systemizing an exchange and keeping it in order.

Our other specialties are:

Blanks, Books and Forms for Telephone Exchange and Toll Line Bookkeeping and Accounting

Toll Tickets
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Voucher Checks
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Fine Stationery

Special Forms of All Kinds

Write for Sample Forms and Prices.

THE TELEPHONE PRINTING CO.,
DEFIANCE, OHIO.

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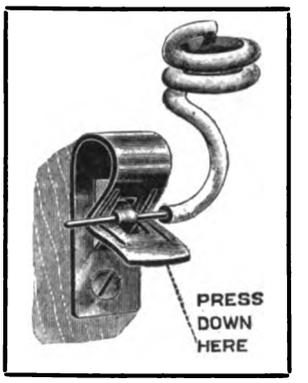

Batteries cost no more when equipped with the Fahnestock Spring Binding Post than with the old style Screw Post.

Let us send you a sample. It's free.

Fahnestock Transmitter Co.

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THE MOST EFFICIENT STORAGE BATTERY TO OPERATE
THE MOST ECONOMICAL STORAGE BATTERY TO MAINTAIN

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GENERAL STORAGE BATTERY COMPANY

NEW YORK
42 BROADWAY

Sole Manufacturers of the BIJUR "HIGH DUTY" STORAGE BATTERIES
INSTALLATIONS RENEWALS

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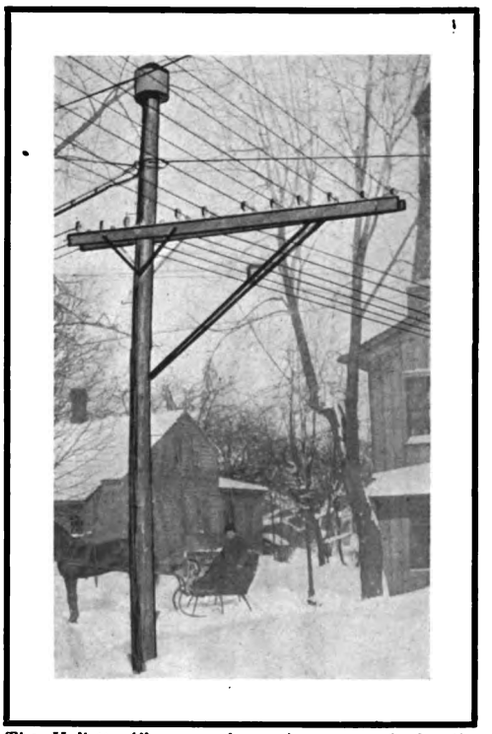
Company, Minneapolis, Minn., 1,780 pairs; Lawrence Home Telephone Company, Lawrence, Kan., 1,020 pairs; Kittaning Telephone Company, Kittaning, Pa., 800 pairs; State Line Telephone Company, Peekskill, N. Y., 640 pairs; Oneonta, N. Y., 200 pairs; Summerville Telephone Company, Dubois, Pa., 320 pairs; Tri-State Telephone Company, Fairbault, Minn., 560 pairs; New Ulm, Minn., 400 pairs.

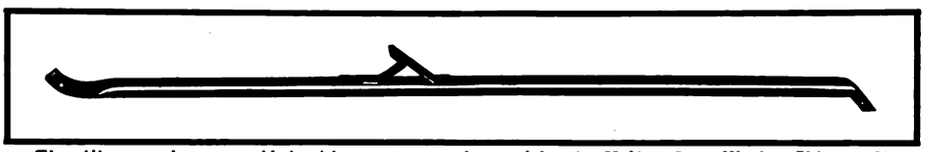
A NEW CROSS-ARM BRACE.

WHEREVER it is necessary to run an open wire lead along a road lined with trees, it is necessary to either insulate the wires, or else to so place them that they cannot come in contact with the branches. When the latter remedy is employed it is customary to place the arm in an overhanging position and brace the end furthest from the pole with some sort of a brace. The Hallett Iron Works, of Chicago, Ill., has placed on the market a brace known as the alley arm, which is specially designed for this method of construction. Two views of this device are herewith given, one of the braces showing details of design and the other its application. When in position it reduces the forward thrust on the arm to a great extent, and is held in place by carriage bolts in just the same way that an ordinary cross-arm brace is fastened. It is provided with a footrest to enable linemen to work in safety upon it. The company claims it will hold as many men on the cross arm as can be spaced on its length.



The Hallett Alley arm brace in use, made by the Hallett Iron Works, Chicago, Ill.

THE WILLIAMS TELEPHONE AND SUPPLY CO., 73 to 79 Central avenue, Cleveland, O., manufacturers of magneto telephones and line supplies, is mailing a new and well bound catalogue entitled "A Short Trip to Town." It presents the various articles of its manufacture in the pages of this descriptive publication in a first class manner. The reproductions of telephone apparatus exhibit care and taste in their finish and selection. In all eight different types of instruments are illustrated, together with detailed descriptions. Auxiliary apparatus, such as induction coils, extension bells, etc., are fully described. This catalogue will be furnished to all parties interested in general telephone apparatus and supplies upon request.



The Alley arm brace provided with a step, manufactured by the Hallett Iron Works, Chicago, Ill.

THE EWING-MERKLE ELECTRIC CO., 1106 Pine street, St. Louis, Mo., is distributing copies of its interesting pamphlet entitled The Everbest Magazine. The company states, "The Everbest will be sent free occasionally to those whom we think will appreciate its merits." In this little magazine is found an amount of electrical data commingled with interesting extracts which make it worthy of examination.

THE BISSELL COMPANY, Toledo, O., will send a souvenir scarf pin free to those not present at the recent convention. The design of this excellent little keepsake is that of a frog, representing the well-known trade mark of the company.

THE INTERNATIONAL TELEPHONE MANUFACTURING COMPANY, Chicago, Ill., is furnishing a complete central energy equipment for the Home Telephone Company, Meridian, Miss. The plant will be started with an immediate equipment of 1,200 lines, having a switchboard capacity and conduit provision for 4,500 lines. The construction will be a full cable system with cables or insulated wires for all leads.

The switchboard is this company's latest improved central energy, lamp signal multiple type with double supervisory clearing-out signals. It includes its new four-party line equipment with indicating selective keys in each cord circuit.

THE AUTOMATIC ELECTRIC COMPANY, Chicago, Ill., has recently closed three contracts, of which the largest is for a 15,000 line automatic telephone system for Havana, Cuba. This is to displace the old "Red Telefonica" system of Havana, formerly owned by a Spanish company, but now a part of the properties of the Cuban Telephone & Telegraph Company.

The latter company at the same time contracted with the Automatic Electric Company for a 600 line automatic system for the town of Marianao, Cuba, a suburb of Havana. The initial installation at Havana will be 5,000 lines.

The Cuban Telephone & Telegraph Company will soon erect a new building and lay a new conduit and cable system for the new plant.

The officials of the Cuban Telephone & Telegraph Company who came to Chicago late in June to close the contract were President Roland R. Conklin, Vice-President S. L. Jarvis and General Manager W. M. Talbott.

The other two contracts recently closed by the Automatic Electric Company were for a 250 line exchange at Miamisburg, Ohio, for the Montgomery County Telephone Company, and a 1,200 line exchange for the Dakota Central Telephone Company at Aberdeen, South Dakota.

These two latter exchanges will be the first to have the new automatic four-party lines with selective ringing and lockout recently worked out by the Automatic Electric Company's engineers.

THE BAIRD MANUFACTURING CO., of 24 Michigan St., Chicago, Ill., reports that additional orders are being constantly received for its secret service telephone system, which proves that this system is just what telephone companies have needed for a long while. Amongst others who are extending this equipment for lockout and selective ringing apparatus might be mentioned the Home Telephone Company, of Plattsburg, Ohio, which has used this system for over three years.

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Wholesalers of Michigan White Cedar **POLES** *of* QUALITY

Five Yards *Prompt Shipments*

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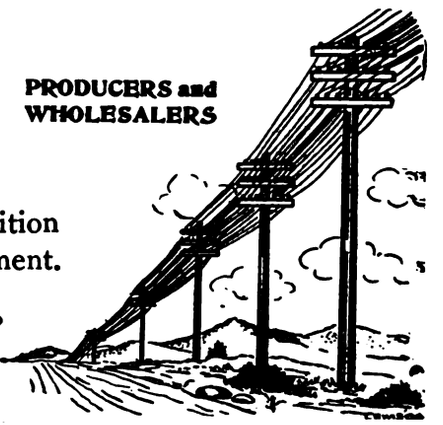
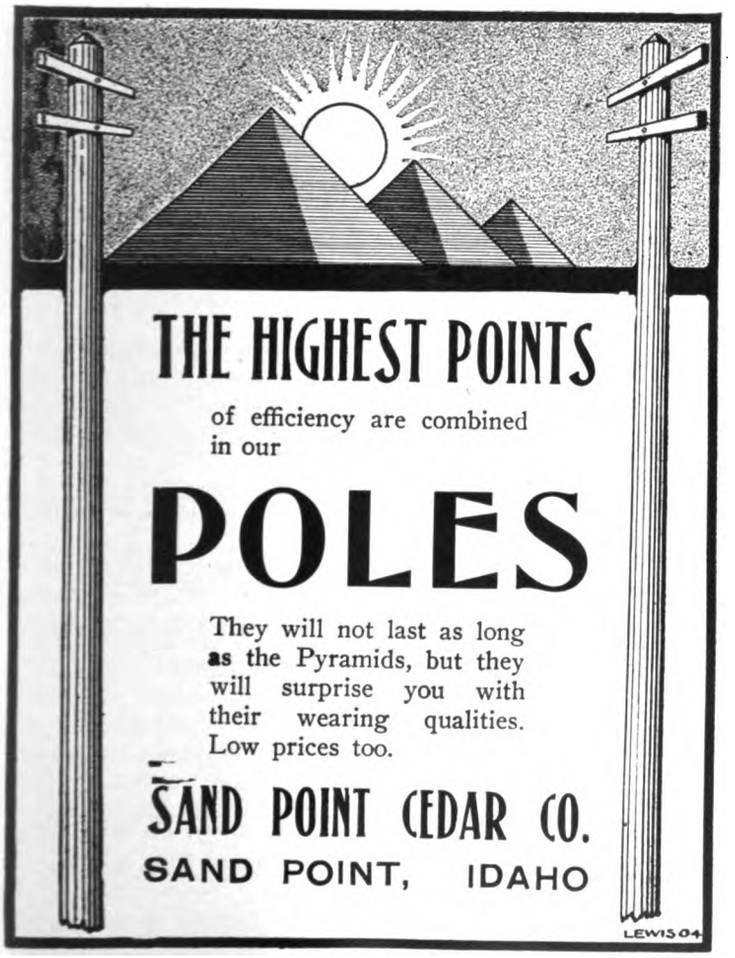
PRODUCERS and WHOLESALERS

WE always carry a large stock of all sizes of White Cedar Poles, and having yards on all principal railroads in Northern Michigan and Minnesota, are in position to make immediate shipment.

"From the Stump to the Line."





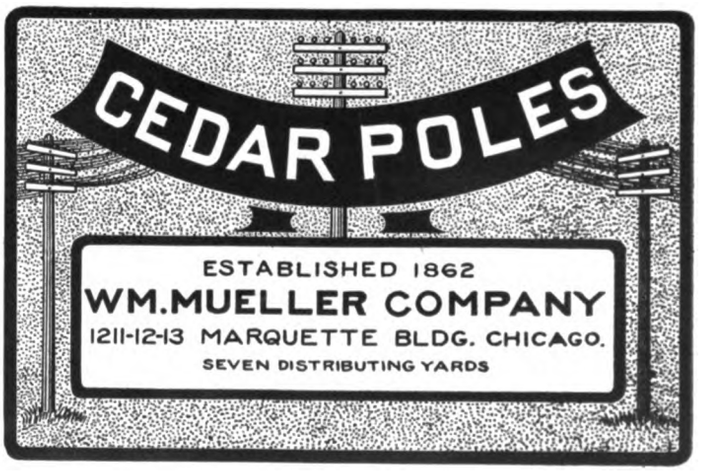
WHITE CEDAR POLES

AT YOUR SERVICE

Whether it is an order, inquiry for prices or any other information at our command, your correspondence is always welcome and appreciated.

PAGE & HILL CO.

Lumber Exchange, Minneapolis, Minn.



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THE WEEK'S MESSAGES

FINANCIAL.

GALESBURG, ILL.—The Galesburg Union Telephone Company has increased its capital stock from $150,000 to $250,000. The money will be spent in improving its system.

RED OAK, IA.—The Montgomery County Telephone Company, of Red Oak, has increased its capital to $41,800.

FRANCHISES.

VICTOR, COLO.—The El Paso Telephone Company has applied to the city council for a franchise, and the indications are that it will be granted.

COMBINATIONS.

SHARON, CONN.—The Farmington Valley Telephone Company has purchased the Sharon Telephone Company. The newly purchased company has seventy miles of wire and about 400 subscribers. It runs through Sharon, Lakeville and Salisbury and connects with Buffalo, N. Y.

MUNISING, MICH.—The Munising Telephone & Electric Company has been sold by W. M. and C. R. Langley to W. R. Burns.

CAMDEN, N. Y.—The Camden Telephone Exchange has been reorganed. It is to merge with the Home Telephone Company of Utica, and will establish a first class service as far south as Oneonta, east to Albany, and north as far as Watertown.

WILLIAMSPORT, PA.—The People's Division of the Consolidated Telephone Company, of Pennsylvania, has secured possession of rural telephone lines touching Lake Winola, Newtown and Ransom Townships, Nicholson, Factoryville and Tunkhannock. These lines give the People's Company direct communication with the entire farming section of Northeastern Pennsylvania.

BAKERSFIELD, VT.—The Franklin County Telephone Company has purchased the telephone line from W. O. Start, of Bakersfield. The Franklin County Company will establish an exchange at East Fairfield, and will run farmers' lines through the towns of Bakersfield and East Fairfield.

ELECTIONS.

MOORELAND, IND.—The Mooreland Telephone Company has elected the following officers: President, W. R. Lines; vice-president, Jesse Luellen; treasurer, U. S. Moore; secretary, E. J. Davis.

GLADWIN, MICH.—The Gladwin County Telephone Company has elected the following officers: President, Fred Powell, secretary, H. L. Dow; treasurer, William Neely.

JAMESTOWN, N. Y.—The Home Telephone Company, of Jamestown, has elected the following officers: President, Jules Vautrot; vice-president, William Maddox; secretary, T. S. Lane; treasurer, C. W. Herrick. S. B. Burchard, Geo. B. Devoe, R. C. Sheldon, B. D. Phillips, C. B. Selby, R. T. Izant, C. C. Clawson with the officers form the board of directors.

NEW COMPANIES.

GENESEO, ILL.—The Geneseo Telephone Company has been incorporated with a capital stock of $2,500. The incorporators are C. Tomlinson, George B. Dedrich and D. M. Stamm.

MILLEDGEVILLE, ILL.—The Milledgeville Mutual Telephone Company has been incorporated with a capital stock of $10,000. The incorporators are T. H. Fleming, A. B. Puterbaugh and A. M. Fike.

EARLHAM, IA.—The Adams Township Mutual Telephone Company has been incorporated with a capital stock of $2,000. Incorporators: L. L. Norse and others.

KELLERTON, IA.—The Kellerton Mutual Central Telephone Company has been incorporated with a capital of $10,000. President, Thomas A. Drake; vice-president, William Gray; secretary, Jas. Farmer.

LEOPOLD, IND.—A new telephone company, to be known as the Leopold & Reno Telephone Company, has been organized here. The new company expects to develop the county in and about Leopold. A. J. Meumier, Dr. Taylor, James Ward and J. J. Jennett, directors.

MALVERN, IA.—The Mills County Telephone Company has been incorporated with a capital stock of $50,000. Incorporators: M. W. Sells and others.

MYSTIC, IA.—The Mutual Telephone Company has been incorporated with a capital stock of $5,000. Incorporators: J. W. Calvert and others.

GRAND MARAIS, MICH.—A telephone company has been organized at Grand Marais and the work of installing the system will be commenced as soon as possible. C. C. Smith is president and R. E. Schneider secretary.

THREE RIVERS, MICH.—The Southern Michigan Telephone Company has been incorporated with a capital of $300,000.

CONCORDIA, MO.—The Concordia Telephone Company has been incorporated with a capital stock of $2,500. Incorporators: F. H. Kueck, A. W. Gurbert, Geo. C. Duensing, Henry Flicken, J. S. Klingenberg and others.

CALDWELL, NEB.—The Caldwell & Arnold Telephone Company has been incorporated with a capital stock of $5,000.

VOLNEY, N. Y.—The Volney Telephone Company has been incorporated to operate a telephone system between Fulton and Volney. The directors are E. B. Tice, James Vant, J. S. Moss, Robert Simpson, Jr., Eugene Rowe, E. T. Hart and C. E. Sackett, of Volney.

WEEDSPORT, N. Y.—The Weedsport Telephone Company has been incorporated with a capital of $20,000 by C. S. Caywood, N. F. Durston and George R. Nash, all of Weedsport.

BELLINGHAM, WASH.—The Farmers' Mutual Telephone Company has been incorporated with a capital stock of $45,000. Its principal place of business is Bellingham, but its lines are to accommodate the rural districts. P. D. Harkness, of Everson; J. L. Balley, of Nooksack; G. W. Herndon, August Nyman and Edward Brown, of Custer; A. W. Frost, of Lynden, and L. G. Van Valkenberg, of Sumas, are the trustees.

MISCELLANEOUS.

MELBOURNE, AUSTRALIA.—The estimated cost of the proposed telephone line between Melbourne and Sydney is $150,000. The Victorian section will cost $55,000, and the New South Wales section $95,000—the line proposed being of sufficient capacity to carry extension traffic to Brisbane and Adelaide if required.

HUNTINGTON, IND.—Plans are forming for an Independent telephone system in this city, to replace the United Telephone Company, which was recently sold to the Bell.

CLINTON, N. Y.—The Clinton Home Telephone has moved into new quarters. A new switchboard has been installed which will accommodate 1,000 subscribers. M. Stanley Powell started the local system about nine years ago with less than half a dozen telephones, and before the first of next January it is expected there will be 400 subscribers. The ground floor of the new building will be used as the exchange and the manager's office.

SPRINGVILLE, N. Y.—The Springville Telephone Company has signed a contract with the Inter-Ocean Telephone & Telegraph Company for its long-distance telephone connections. The Inter-Ocean's lines connect it directly with the Frontier Telephone Company of Buffalo, and with over 75,000 Independent telephone subscribers in Western New York.

PERSONAL.

CHARLES F. TRONENDYKE has been appointed wire chief for the Canton Home Telephone Company Canton, Ill. Upon his resignation from

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Ward-Leonard Enameled Resistance Units for Telephone Service

Any resistance up to 5,000 ohms on a tube 2 inches long by 7-16 inch diameter.

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Prevent Rot, and Double the Life of Poles, Crossarms and other woodwork by using

AVENARIUS CARBOLINEUM (*registered*), the only reliable, practical and economical preparation in its line.

For further information address

Carbolineum Wood Preserving Co., Milwaukee, Wis.

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ELECTRICAL ENGINEER and CONTRACTOR

Complete Telephone Exchanges Built and Material Furnished.

Cable Construction and Underground Conduit Construction a Specialty.

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DIRECT READING

Voltmeters, Ammeters, Millivoltmeters, Voltammeters Milammeters, Ohmmeters, Portable Galvanometers, Ground Detectors and Circuit Testers.

Our Portable Instruments are recognized as THE STANDARD the world over. Our STATION VOLTMETERS AND AMMETERS are unsurpassed in point of extreme accuracy and lowest consumption of energy.

Weston Electrical Instrument Co.,

Main Office and Works, Waverly Park, NEWARK, N. J.
Berlin—European Weston Electrical Instrument Co., Ritterstrase, No. 88.
London—Elliott Bros., Century Works, Lewisham.
Paris, France—E. H. Cadiot, 12 Rue St., Georges.

New York Office, 74 Cortlandt Street.

Weston Standard Portable Direct Reading Voltmeter.

LOCKERS

and Material Closets made by us have Points of Superiority Over All Others.

We Make Metal Shelving and Screens.

Write for Catalogue and Sample of Metal.

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PHILADELPHIA

No. 309 Reversible Combination Wire and Sleeve Clamp.
Send a two-cent stamp for 48-page catalogue.

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KLEIN'S TOOLS ALWAYS GIVE IT
MATHIAS KLEIN & SONS
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J. W. MIDDLETON & CO.

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Corporation Records

167 DEARBORN ST. CHICAGO

Telephone Companies

needing large lists of supplies are advised to communicate with The American Telephone Journal, if they wish to save money.

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TRADE MARK
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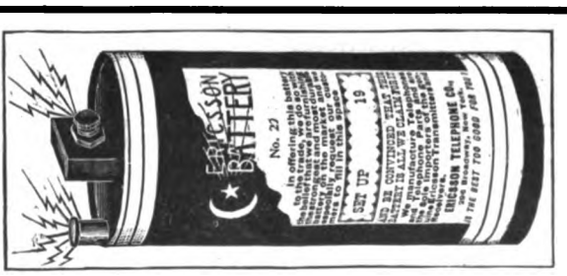
QUALITY PREDOMINATES IN

all apparatus that we make. That is the reason why our apparatus is used exclusively wherever introduced. Candidly speaking, don't you think you had better investigate our claims before placing your next order elsewhere?

INTERNATIONAL TELEPHONE MANUFACTURING COMPANY

Harrison & Clinton Sts. CHICAGO, U. S. A.



ERICSSON DRY BATTERIES

STANDARD OF THE WORLD

They are perfect and not expensive. *Write for particulars.*

ERICSSON TELEPHONE CO.

Mfrs. Switchboards, Telephone Exchanges and Supplies,
296 BROADWAY, - NEW YORK CITY.

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THE WEEK'S MESSAGES—*Continued*

his previous position as wire chief for the Union Telephone and Telegraph Company, Davenport, Ia., with which company he had been three years, he was presented with a solid gold watch fob by his employers as a token of esteem.

WILLIAM BOYSTON has accepted a position with the Iowa Telephone Company at Grinnell, Ia.

M. C. CANFIELD has been appointed manager for the Northern Ohio Telephone Company, at Perrysburg, Ohio.

ELMER HARDING has been appointed manager for the Chariton Telephone Company at Chariton, Ia.

RALPH HAVEN has been appointed cashier for the Home Telephone Company at San Bernardino, Cal.

L. O. PILLSBURY has been appointed manager for the Midland Telephone Company at Spirit Lake, Ia.

FREDERICK STEICHLEY has been appointed general manager for the Douglas County (Wis.) Telephone Company.

New Construction in the Field

ST. JOHN'S N. B., CANADA.—At the annual meeting of the New Brunswick Telephone Company, held in Fredericton, it was decided to erect a number of lines during the present season. They will include a line from Chatham to Dalhousie, connecting with Bathhurst, Campbellton and other places along the North Shore; also a line from Canterbury to McAdam, another from St. Stephen to Moore's Mills and from Lepreau to Musquash. The company also decided to connect with the Kamaraska Telephone Company, by extending the line to Edmundston. A $6,000 brick building will be erected in Fredericton for the use of the company's head offices.

ATOKA, I. T.—The Pioneer Telephone Company contemplates numerous extensions to its system.

HARLAN, IA.—The Farmers' Mutual Telephone Company is building ten miles of new lines.

LITTLEPORT, IA.—The Interstate Telephone Company expects to rebuild its Littleport and Elkader lines.

GREENFIELD, IND.—The Morrison Telephone Company will install 31,000 feet of new lead covered cable.

WENDELL, MASS.—The Highland Telephone Company is building a new line to Wendell Centre.

BENWOOD, O.—The lines of the Benwood Telephone Company from New Castle to Sardis are completed.

BROWNSVILLE, PA.—The Tri-State Telephone Company has extended its lines into Brownsville.

FT. RITTER, IND.—The Tri-County Telephone Company has incorporated with a capital stock of $5,000. The company will establish an exchange in Ft. Ritter and develop the Lawrence County field. Harvey S. Dixon, W. P. Holland, W. H. Reed and others, directors.

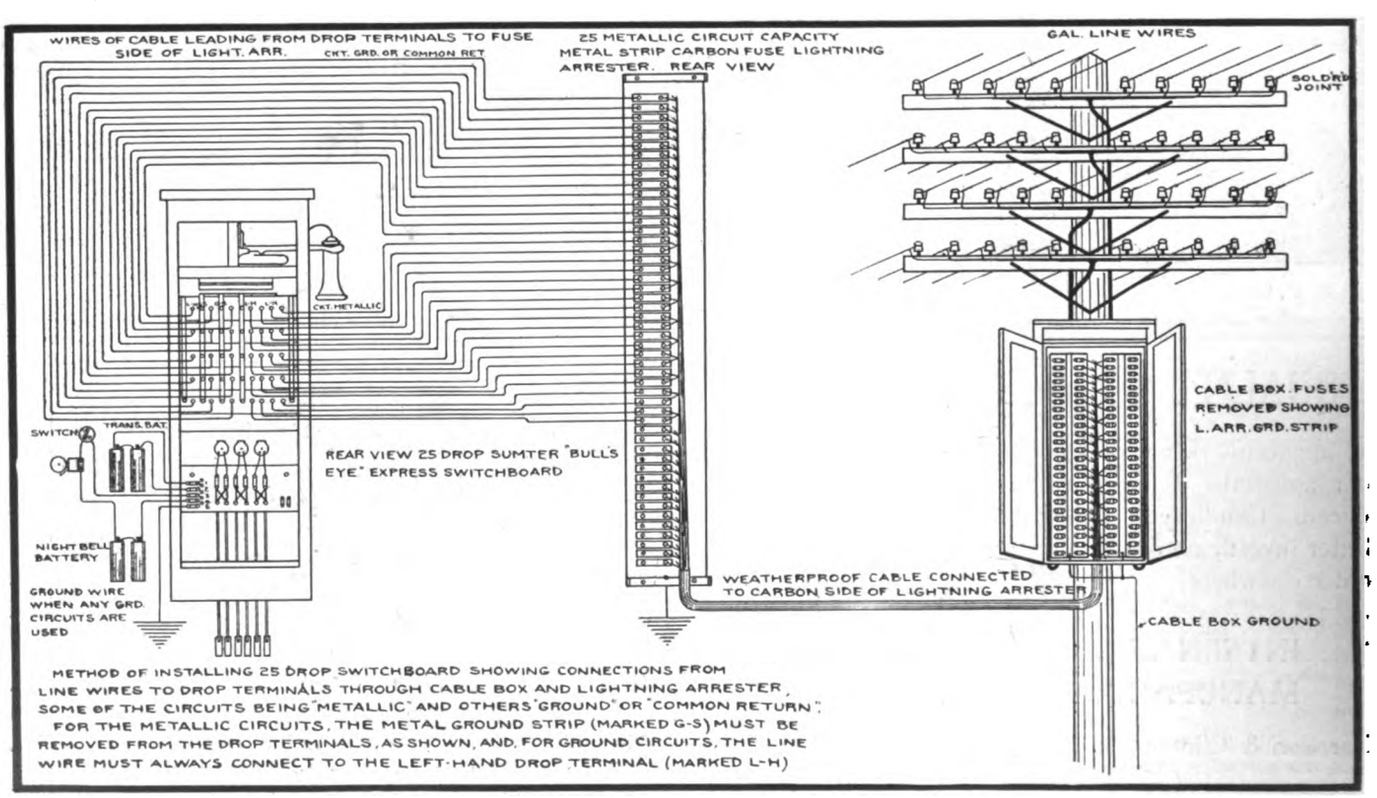
LINCOLN, NEB.—The Lincoln Telephone Company is improving its service by replacing its open wire lines by cables. It expects to have the work completed by October 1.

UTICA, N. Y.—The Utica Home Telephone Company is laying 10,000 additional feet of cable. The new cables will add about 900 more lines to the system. The new exchange which has been opened in Newport has now over 100 subscribers and the Clinton exchange, which is now occupying its new building, has over 350 subscribers.

MINTO, N. D.—The Northwestern Telephone Company will install an exchange at this point. Work will begin at once.

PETERSBURG, VA.—The Petersburg Telephone Company is having plans made for its new telephone exchange building to be erected at an early date. The new building is to be furnished with an entirely new equipment.

WHEELING, W. VA.—The National Telephone Company will shortly begin extensive improvements in its system at Benwood and through the interior of Marshall County. A submarine cable is to be laid across the Ohio River to Bellaire, which will greatly facilitate the service from Bellaire to points in Ohio.



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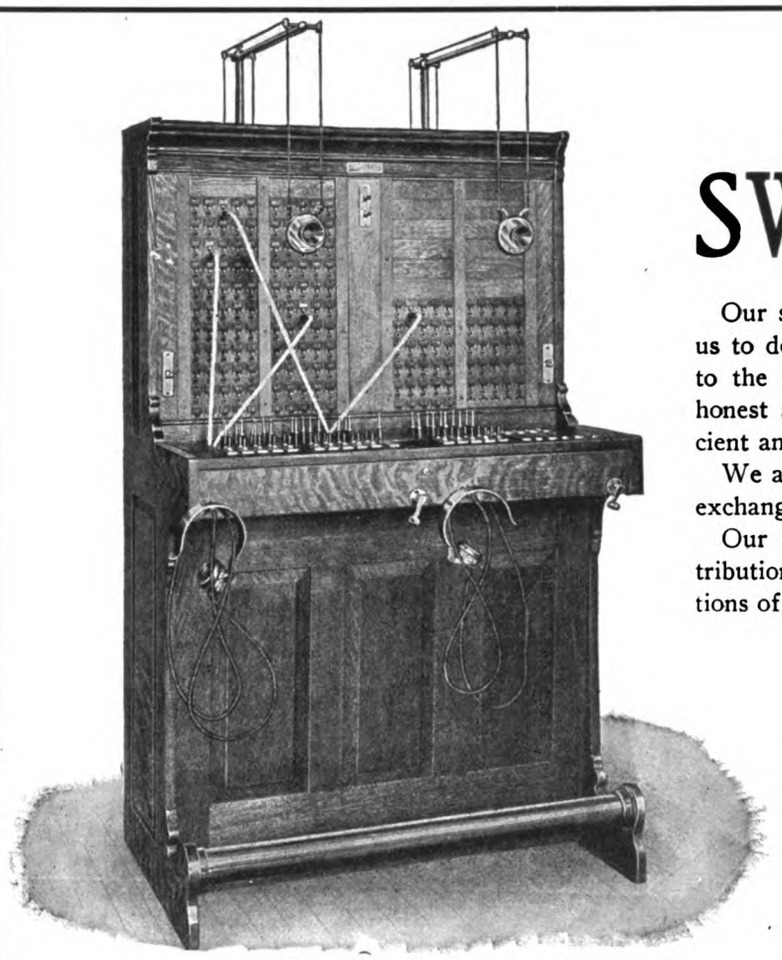

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Our study of small exchange requirements has helped us to design magneto boards exceptionally well adapted to the service desired. Our well known methods of honest and careful construction make these boards efficient and substantial.

We are in a position to quote upon and build magneto exchanges of any size and solicit your inquiries.

Our new switchboard catalog is now ready for distribution and will be mailed upon request. The descriptions of MONARCH BOARDS will interest you.

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$4.60 AUTOMATIC VS. $9.40 MANUAL

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Operation and Maintenance Expense per 'phone per annum of one of the Telephone Companies that replaced their Manual with our AUTOMATIC SYSTEM. (We will send name of company and detailed statement of above upon request.)

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Hand in hand with the decrease in operating expenses goes the increase in quality of service. This latter means more business. All these Automatic advantages combined mean higher values for securities, bigger dividends for the stockholders.

Don't you see that you're wasting money on that out-of-date Manual equipment of yours? If you're a new company, start with Automatic, and start right.

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Van Buren and Morgan Sts. CHICAGO, ILL.

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LINE AND CUT-OFF RELAY WITH COVER REMOVED

THE successful working of the modern multiple switchboard is in a great part dependent on the relays.

Our new visible contact relay, shown in the above illustration, is made to fulfill the most exacting requirements of exchange service, yet, like all other Dean apparatus, it is simple in design.

The movable contact points are located at the extreme front of the relays, in plain view for inspection when the covers are removed. These covers entirely enclose the working parts of the relay, being secured in place by milled-head thumb-nuts which in turn are fastened in the shell so as not to become misplaced and lost when removed.

The armature can readily be removed without tools and rocks over two fixed pivots which insures a correct normal working position in respect to the core. It is prevented from directly touching the core by coming against the neck of a brass spool head, similar in construction to our new ringer. This allows the use of a very small air-gap. Increased efficiency of operation results.

Relay spool terminals, as ordinarily constructed, are conducive of much trouble. The terminals are provided with two projections, like the roots of a tooth, securely riveted in place in the spool heads. These terminals will not get loose, neither can they be pushed through so as to injure the windings. Furthermore, the ends for soldering are fluted and perforated, so that attaching the outside wiring quickly and securely is assured. All of our relays are adjusted for proper operation in our factory and this adjustment is made permanent so that there is absolutely no need of further manipulation, thus making a most reliable piece of apparatus.

The simplicity and reliability of our relays is only one of the many reasons why our common battery switchboards are the best to be had.

Our guarantee protects you.

Let us figure on your new equipment.

THE DEAN ELECTRIC COMPANY
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Buy Your Telephones and Switchboards from Us.

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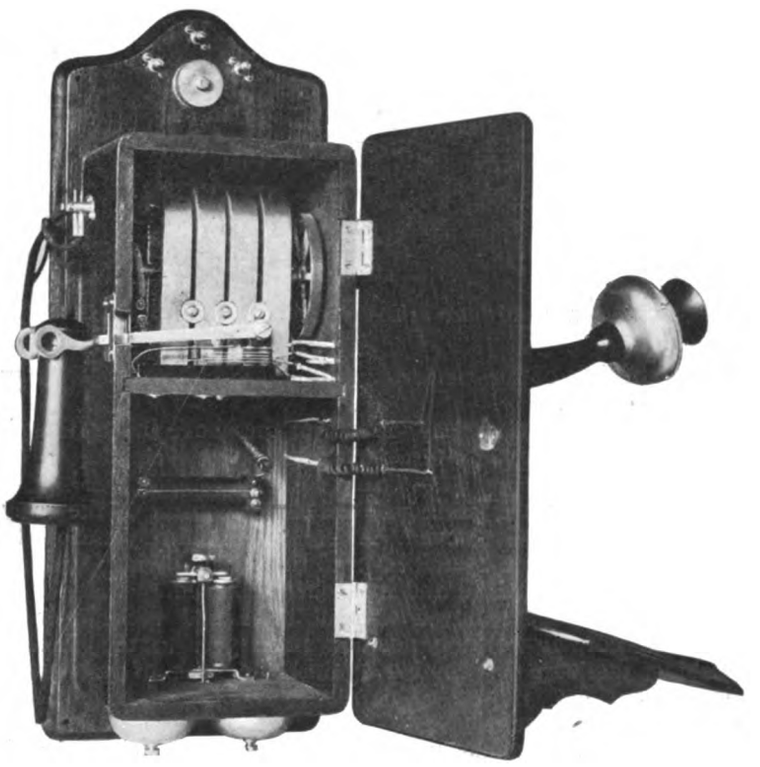

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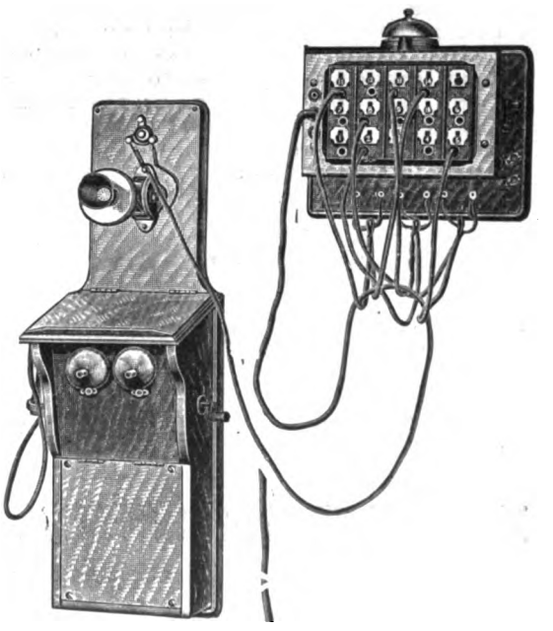
If you wish to secure the best possible service you must have the best apparatus. Send for catalogue, prices and sample telephones for inspection and test.



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DO YOU KNOW THE ADVANTAGES OF THE

4-PARTY HARMONIC SYSTEM?

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Send us trial order; the proof will be absolute.
Remember the trial costs you nothing; we pay expenses.
Plant not paying dividends? How queer! Haven't you heard of our selective system? Only system that selects over unbalanced lines. "Write us for circulars."

It's up to you to investigate
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This selective system a dividend will pay
And keep the trouble man's hair from turning gray.

Address all communications plainly with street and number.

MODEL ELECTRIC CO. BURLINGTON, IOWA
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Sole Manufacturers of Model Selectives, Bridging and Series Telephones

The Mogul

Head-Band Receiver

This is the one you will ultimately adopt. Try it now. We have not the space to argue, but a sample will present a dozen convincing facts. Write us.

Agents wanted to sell our farm line goods.

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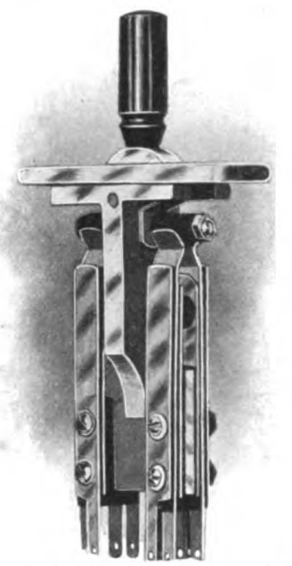
KEYS

Of course, the successful operation of a board does not depend entirely upon the keys with which it is equipped; nevertheless, we make ours of as good material and test them as carefully as if this were true.



No. 16—Ringing and Listening Key.

Pure Platinum Contacts

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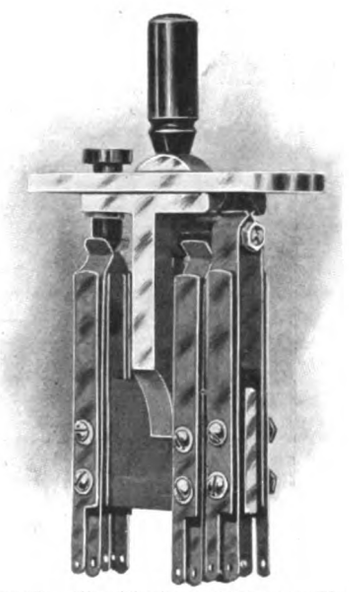

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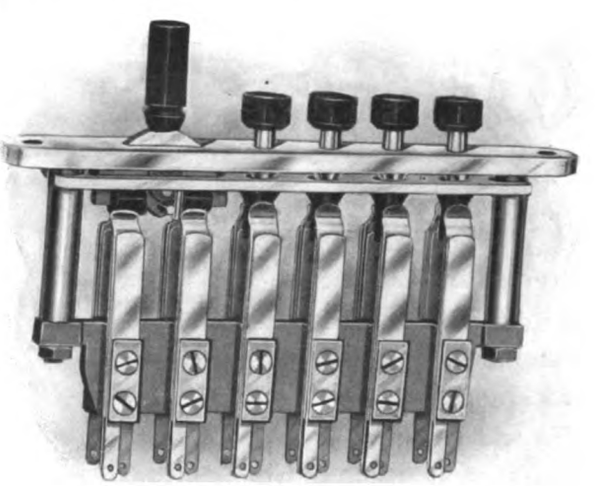

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Our four-party selective indicating key, shown here, has been thoroughly tested by many of the leading Independent telephone companies.

This key only introduces two contacts in the talking circuit—a good point.

We are always glad to mail bulletins or circulars free.

TELEPHONE M'F'G. CO.

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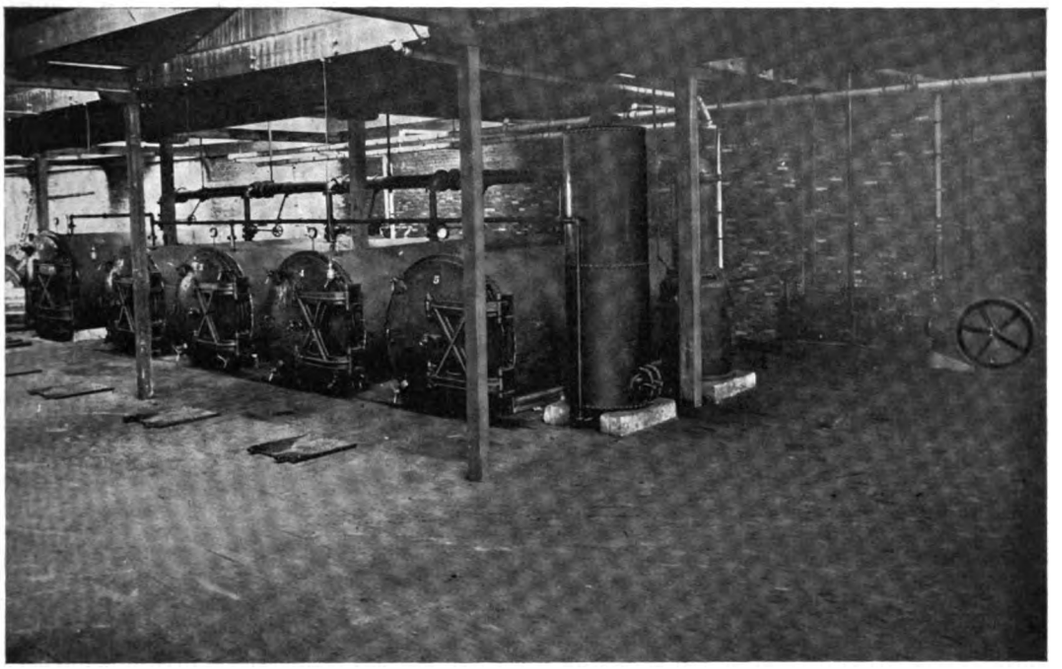

The high insulation and low capacity of lead encased telephone cable depends *directly* upon the *dryness* of the cable core, therefore the operation of drying it must be performed with extreme care.

This drying is done by means of ovens, shown in the illustration. These are large iron cylinders having a capacity for drying thousands of feet of cable core, each oven being closed by an iron door.

Cable core is placed in these ovens and the temperature raised. After the core has assumed this higher temperature a vacuum pump is started and the air and moisture are pumped out of the oven, leaving the core perfectly dry. A valve to the pump is then closed and absolutely dry air is allowed to enter the oven and be absorbed by the cable core.

This operation of drying requires the supervision of experienced employees *day* and *night*.

All telephone men realize that cable is not a good investment *unless it is perfect*. We are determined to produce only the *best* cable, consequently, we give it such rigid tests that when it leaves our plant, *we know* it is perfect.

In buying cable its quality that counts.

We are always glad to quote prices.

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ROCHESTER.,N.Y. CHICAGO.,ILL.

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STANDARD W. U. TEST SET

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The "Model K" Set is the most complete, compact and convenient set on the market, and is a favorite with telephone men; makes every fault and resistance test, as well as many special tests.

Then there is the "Universal" and the "Jr. W. U. Set."

We also make a full line of instruments for Cable Testing, Conductivity and Inductance Tests, etc.; Galvanometers for Shipboard; Electrometers, Condensers, etc., etc.

Our Catalogue Matter is a Liberal Education.

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38 West 13th Street, New York City

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Portable Restaurant Set Pay-Station

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WHY?

Because Baird Pay-Stations Pay

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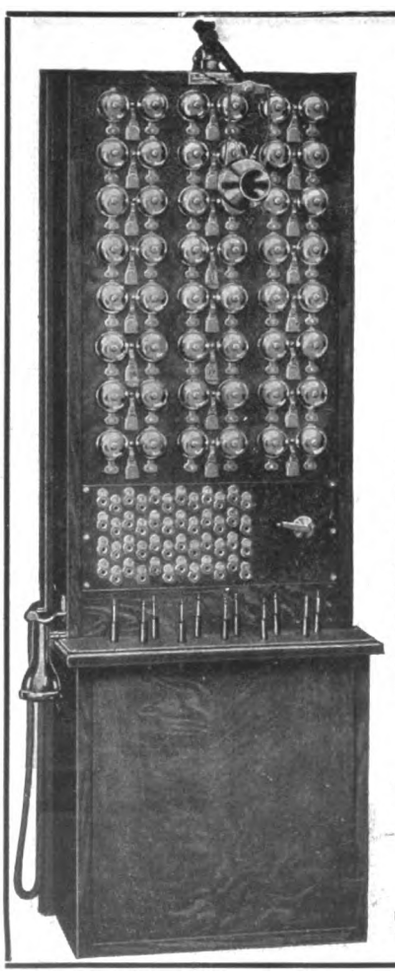
Makers of BAIRD SECRET SERVICE SYSTEM



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Especially for

Rural Installations

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AUTOMATIC INTERCOMMUNICATING 'PHONE for EXCHANGE CONNECTION

EXTREMELY SUCCESSFUL SYSTEM.
ABSOLUTELY NON-INTERFERING TRUNK BUTTON.
HARD RUBBER CONNECTIONS.
SWITCH NOT DEPENDING ON GRAVITY.
ABSOLUTELY EXCLUSIVE FEATURES.

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VOLUME XII *SATURDAY, AUGUST 12, 1905.* *NUMBER 7*

New Type German Railway Apparatus

By Dr. Alfred Gradenwitz.

A TELEPHONE installation for railway signaling and train dispatching which differs largely from any similar equipment in this country, has recently been installed by the Siemens & Halske Company, of Berlin, Germany, for the Saxonian State railways. The switching apparatus is illustrated in Fig. 1. This consists of a hardwood case which serves as a cover to the terminal connections and wiring. Upon its front surface are mounted two sets of four way switches, a signal bell, a milliammeter and two double contact radial switches. The main switches control the circuit arrangements and take the place of the customary jacks and plugs. The milliammeter is used for testing purposes and is controlled by the radial switches. This arrangement permits ready tests for line conditions and to locate any trouble which may occur in the operation of the line or instruments.

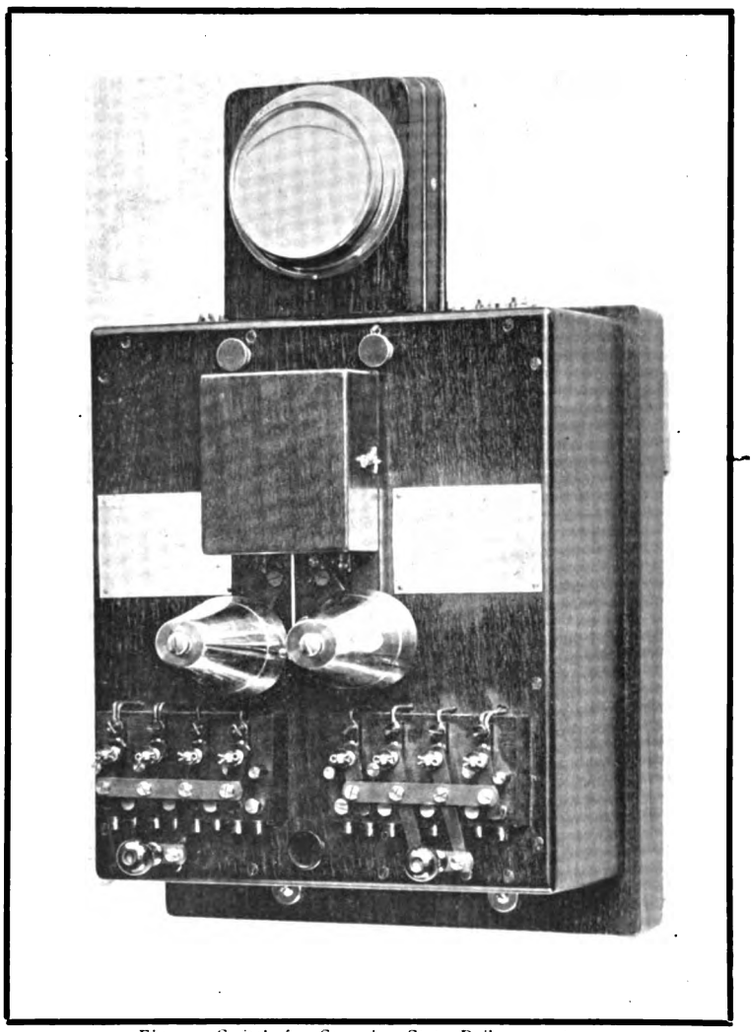

Fig. 1. Switch for Saxonian State Railway system.

The substation telephone is shown in Fig. 4. The noteworthy feature in respect to this apparatus is the compact arrangement of the parts and the mechanical protection afforded by the design of the containing cabinet.

Attention is drawn to the use of a flexible arm as a receiver support. Movement of this arm from the horizontal position operates a rotary switch, which takes the place of the usual hook lever, cutting out the signal circuit and placing the talking mechanism in circuit. The arm can be adjusted to the requirements of the hearer and has an additional advantage in doing away with the ordinary type receiver cord, thus greatly lessening the troubles due to cut-outs in the tinsel conductors. Auxiliary receivers are, however, furnished of the regular type for use in case of emergencies. Below the box holding the mechanism is mounted a sensitive vacuum lightning arrester, which protects the apparatus against lightning or other stray currents of a harmful nature, in place of the usual carbon plate type of arrester.

The bell mechanism is protected by a perforated iron cover, upon the front of which is a frame to hold an instruction card. The transmitter is mounted in a permanent horizontal position and is well protected from mechanical injury by a heavy cast front plate. Besides the usual lock, two plates are provided at the bottom of the box, as shown in the illustration. These can be fastened by a padlock or sealed by means of wires and the usual lead seal to prevent unauthorized persons tampering with the mechanism.

The circuit arrangement is radically different from general practise. Two sets of batteries (MB and MB_2) are employed, one at each end of a line, as shown in Fig. 2. Between them the various substations,

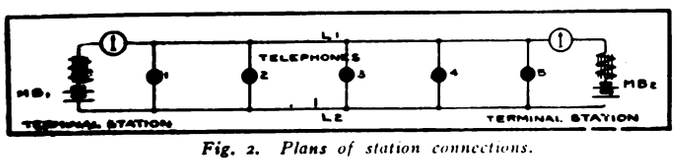

Fig. 2. Plans of station connections.

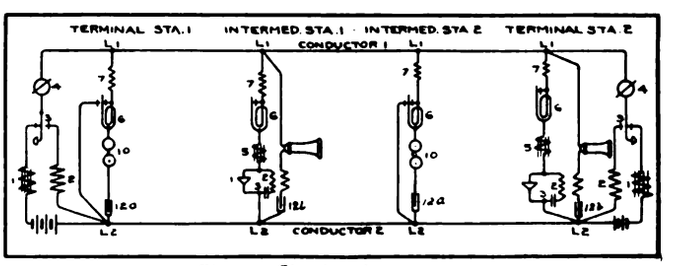

Fig. 3. Circuits of apparatus.

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1, 2, etc., are placed in multiple across the lines L_1 and L_2. These batteries are arranged with like poles connected to the same sides of the circuits, so that when the instruments are not in use no current is flowing. In series with each battery is a retardation coil which prevents the signaling current being short-circuited through the battery and also excludes the alternating currents set-up when persons are using the apparatus.

Figure 3 shows the circuit arrangements of the telephones at the switch and substations. The apparatus is as follows: 4 is the mili-amperemeter controlled by the switch 3; 1 is the retardation coil shown in Fig. 2, and 2 is a plain resistance coil to cut down the current flow in the ammeter testing circuit; 7 is additional non-inductive resistance placed in circuit with the ringing and listening circuits; 6 is a magneto generator; 10 is the signal bell and 12a is a large capacity condenser to prevent the flow of direct current through the signal circuit. In the talking circuit 1 is the transmitter, 2 the primary windings of an induction coil, 3 a condenser to open the primary side to direct current, 5 an inductive resistance to cut down the current to the transmitter, and 12b is a medium size condenser in series with the listening circuit.

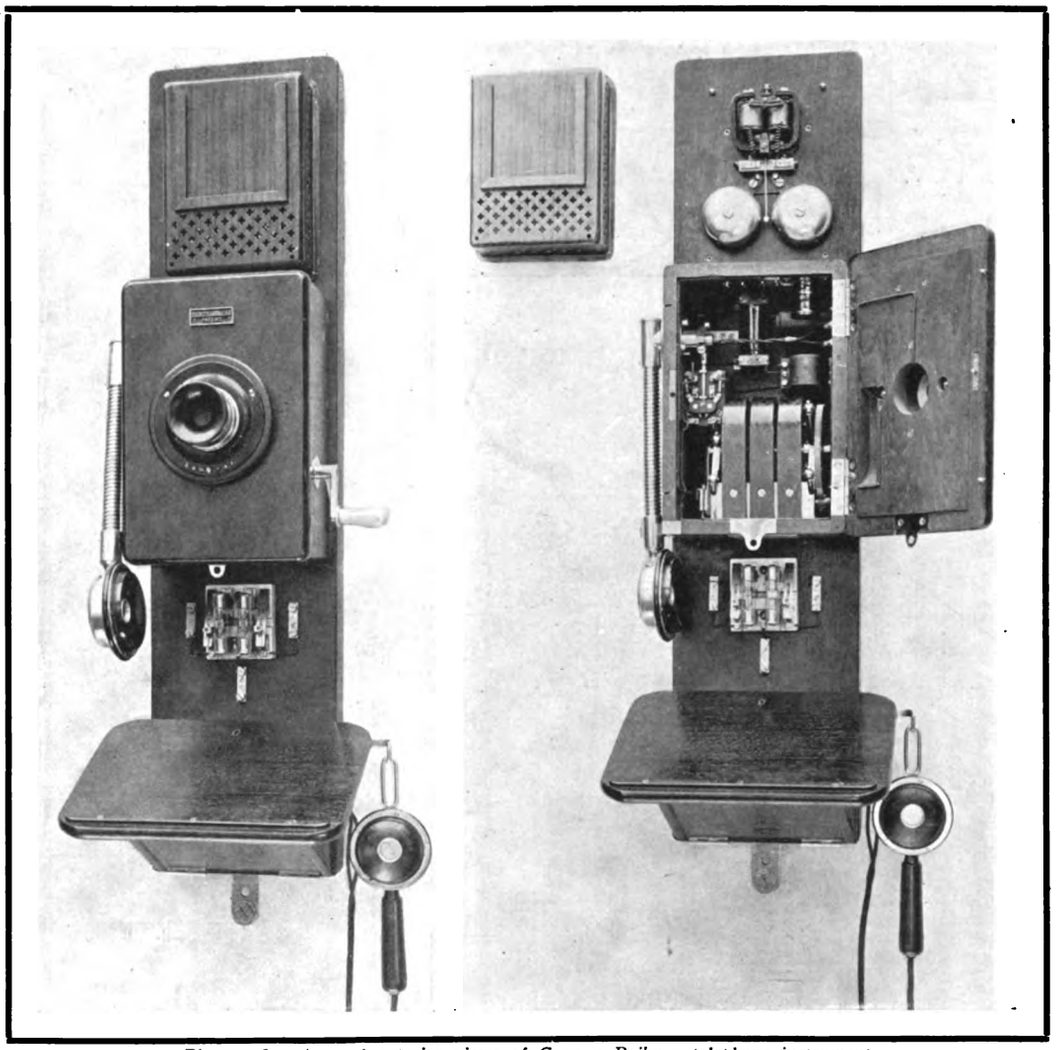

Fig. 4. Interior and exterior views of German Railway telephone instrument.

The operation of the system is as follows: Communication is established between two stations by first signaling with a generator, 6, associated with the ringing circuit. The act of ringing places a short circuit around the local bell and condenser. Talking conditions are as shown. The primary battery circuit being closed through the short circuit of the generator 6 in series with the retardation coil 5 and transmitter 1. The listening circuit is self-evident from an examination of the drawing Fig. 3.

An interesting feature in connection with this circuit is the insertion of the magneto 6 in series with the transmitter. If the battery current fails the generator is employed to furnish talking current. This it is possible to do, because of the employment of the retardation coil 5, which smoothes out the acute peaks of the alternating wave and makes it effective for talking purposes in case of an emergency. The switch arrangements are not shown in the illustration, but consist of make and break contacts for the signaling and talking circuits, so arranged that when one circuit is cut in the other is open. Terminal stations include besides the switching mechanism a regular type telephone instrument.

In Fig. 3, intermediate station 1 and terminal station 2 are shown under talking conditions, whilst terminal station 1 and intermediate station 2 are at rest with signalling circuits cut in.

Eight-Party Selective Call Party Line System—Article III

By H. P. Clausen.

REFERRING to Fig. 10, the complete circuit for an eight-party line telephone system is shown connecting to a switch-board terminal consisting of spring jack and drop, and, in diagrammatic form, a simple cord circuit. The circuits of the power panel, and the eight-party selective key are also given. The telephone circuits shown in the upper portion of the drawing have already been touched upon in the previous section of this article. The cord and line circuit does not require any further discussion other than to understand that when the connecting plug is placed in the spring jack, the line drop is disconnected from the circuit.

The power circuits require, however, a more detailed description, so that the operation of the circuits may be understood. Two sets of batteries are shown respectively by *B* plus and *B* minus. *G* represents any standard form of ringing machine delivering a 20 cycle alternating current. This may be either a hand

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generator, pole changer or motor generator, or any other source of power, generally found supplied in a telephone exchange. *P C* represents a current interrupter driven by a vibrating armature movement, which is fed from the battery *B* when the circuit is closed at any one of the points shown in the selective key. Immediately below the cord circuit the eight-party key is illustrated.

Referring to the power panel, it will be observed that 5 metal bars are provided,, numbered respectively 1, 3, 4, 5, 6, 7. Bar 1 connects to earth *E*. Bar 3 connects to the free terminal of generator *G;* the remaining terminal of the generator connecting to earth bar 1. Bar 4 connects to an intermediate point

To signal a regular telephone, depress button *A C*. This causes a flow of alternating current through the resistance lamp *L2* from bar 3, which is connected to the generator *G*. The other side of the alternating current being obtained through the bar 1.

To signal eight-party telephone No. 1, depress button No. 1. This first causes a flow of plus current over the tip side of the line, through resistance lamp *L1* which connects to the bar 4 and intermediate points of battery *B* plus. (It will be observed that the battery *B* plus is connected to the ground bar 1). At the same time, alternating current from the generator *G* passes through the resistance lamp *L2* on the sleeve side of the line.

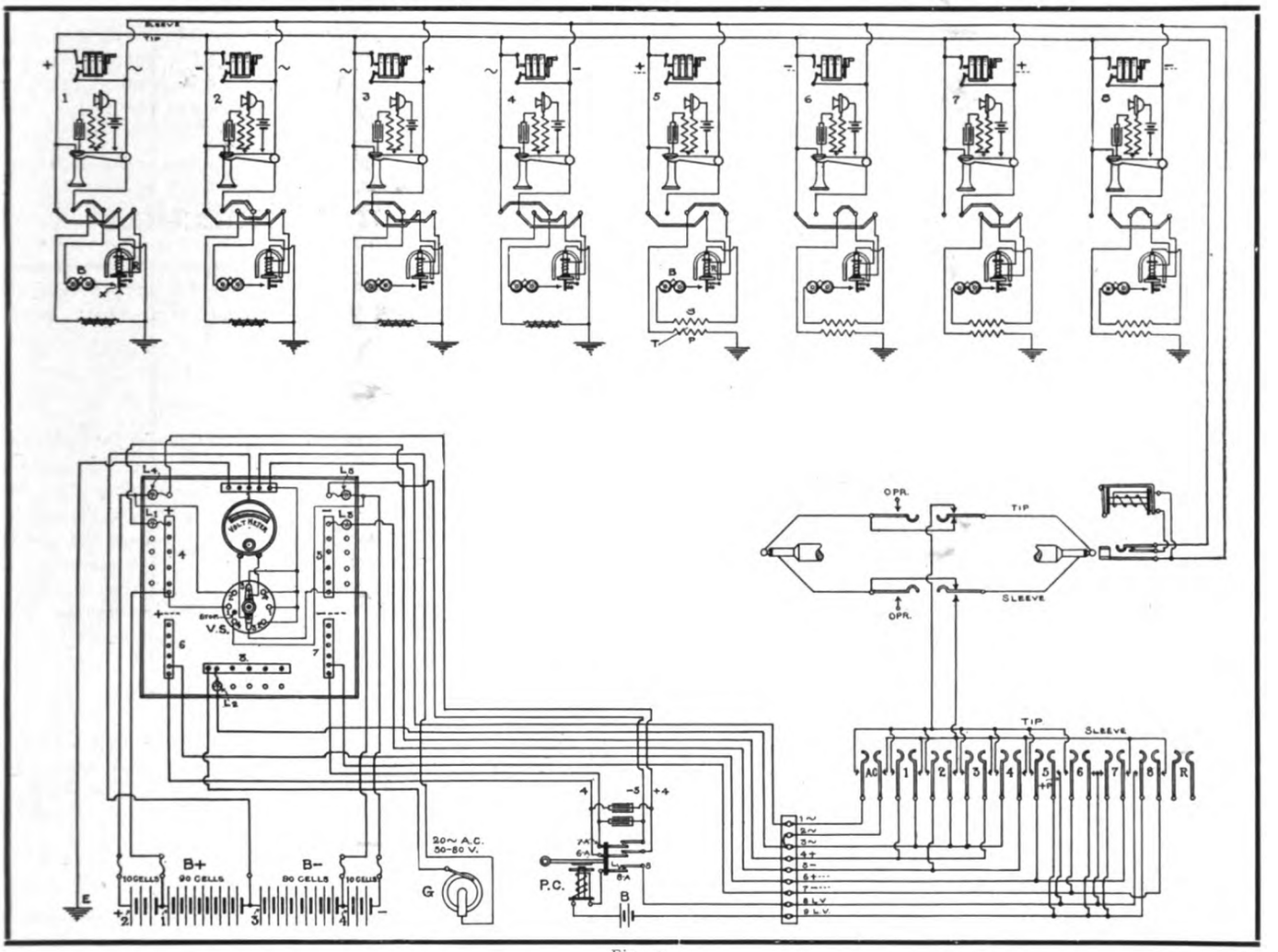

Fig. 10.

of the battery *B* plus, while bar 5 connects to an intermediate point of the battery *B* minus. Bar 6 connects to the plus current interrupting spring of an interrupter *PC*, and bar 7 connects to the minus interrupter spring of the same instrument.

The purpose of the voltmeter shown upon the power panel is to measure the voltages of the *B* plus and minus batteries; this being accomplished by means of voltmeter switch *VS*.

It is necessary to explain that the current which is required for drawing up the relays in the telephones while signaling an impedance station equipment, is not reduced in voltage, as is the current which is required to be projected over the circuit in order to signal a transformer station. Therefore a larger number of batteries is needed for the interrupter circuit, in order to maintain the voltage of the pulsating current at approximately the same value as the direct or uninterrupted current. The reason for this is that the contact resistance at the break points of the interrupter reduces the average e. m. f. of the current projected. The operation of the system at the central office is as follows (remembering that the generator *G* is a constantly driven machine, and that interrupter *PC* only operates when required):

These combinations of current cause the relay and bell of impedance station No. 1 to respond.

To signal station 2, depress button No. 2. The act of depressing the No. 2 button places an alternating current upon the sleeve side of the line, and a minus direct current upon the tip side. This minus current is obtained through the resistance lamp *L C* over the bar 5 from the intermediate point of the battery *B* minus. This battery is grounded, as was explained in connection with the battery *B* plus. When these currents are projected over the line, No. 2 station is signalled, which has already been described as an impedance station equipment of the tip minus sign.

To signal station 3, depress button No. 3. This projects precisely the same current as button No. 1, with the difference that the tip and sleeve connections of the line are reversed. That is to say, a plus current is sent over the sleeve side of the line instead of the tip, and an alternating current is projected over the tip side of the line.

To ring station 4, depress button No. 4. The act of depressing this button places a minus current upon the sleeve side of

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the line with an alternating current upon the tip. Otherwise the signaling operation is the same as was described in connection with calling station 2.

To signal station 5, depress button No. 5. In order to signal this station, it is necessary that a pulsating current is employed. It will be observed that one of the No. 5 key springs when depressed connects the tip side of the ringing circuit through to the bar 6 on the power panel. This bar connects by means of wire 4 to the vibrating spring *6A* on connector *P C*. This connection extends over wire plus 4 to the resistance lamp *L4* to plus side of battery, *B* plus. The remaining spring, when key 5 is depressed, results in closing the normally open contact point, plus *P*, and places battery upon the vibrating movement. This causes the magnet to attract its armature and intermittently sever the connection between springs 8 and *8A* at the point *L*. The vibrating movement continues until the point plus *P* is opened, and results, as will be observed, in projecting an interrupted plus current over the tip side of the line, and operating station No. 5.

To signal station 6: depress button *No. 6*. Depressing this button starts the vibrator *PC* and in the present instance, projects an interrupted minus current over the tip side of the line from the bar 7. This bar is supplied with current through the spring *7A of the interrupter PC*, wire minus 5, lamp *L5* to the negative side of the *B* minus battery.

To signal station 7: depress button No. 7. In order to signal station 5 a positive current was sent over the tip side of the line. An examination of the circuits will show that when button 7 is depressed, a positive interrupted current is projected over the sleeve side of the line, thus signalling the No. 7 instrument.

To call station 8: depress button No. 8. This results in the same circuit combinations in the power plant as were established when button No. 6 was depressed, except that the tip and sleeve sides are reversed. In station 6, the negative current was projected over the tip, whereas when station 8 is signalled, the negative current is projected over the sleeve side of the line.

(Concluded.)

Futility of Legislation to Compel Interconnection

FROM time to time efforts have been made by well meaning but misinformed people to introduce into the legislatures of various states bills which have for their object compulsory interconnection between Independent and Bell companies. To the casual observer these measures may appear to be of great value in the local development of the Independent movement; but it only requires a cursory examination of the state of affairs in general to discover that no greater harm could be done than this enactment.

A bill of this type was recently introduced in the Michigan legislature, but was allowed to die from lack of interest. Similar legislation is proposed in other States.

The consensus of opinion among representative Independent men is radically against the interconnection, as evidenced by the following opinions received by the editor of the AMERICAN TELEPHONE JOURNAL:

E. B. FISHER, SECRETARY,
Citizens' Telephone Co., Grand Rapids, Mich.

THE Michigan Legislature did not act on the bill. It went to sleep and the Legislature has adjourned. The time may come when all the telephone companies in this country will interchange services and arrange for division of the earnings of such services on some equitable basis. At the present time such a proposition probably would not meet with favor generally among telephone men nor give the public any considerable satisfaction. The old adage about leading the horse to water is peculiarly applicable in such a case. Unless the parties who exchange the service are agreed and agreable, the patron is certain to be disappointed. It has not been the policy of the Bell companies in either the United States or Canada to interchange service, except in general terms with those using its licensed instruments; exceptions to this rule are so infrequent and telephones non-Bell so few in number where service is exchanged as only to emphasize this rule. With a continuance of that policy and a disposition to regard as an infringement of its rights any invasion of them, such interchanged service would be subjected to conditions which could not be wholly satisfactory to patrons. It is evident that the blame for faulty service in a divided partnership could not easily be located.

The average patron getting faulty service has little or no conception of the occasion therefor, whether it is an instrument trouble, a line trouble, a switchboard trouble, a battery trouble—any one of numerous possibilities of trouble. In long distance service the difficulties of such a problem are complicated greatly. Without standardization of instruments, and mechanism of all sorts, and without a steadfast purpose to do the best possible, the telephone service at best is not likely to be good, long distance service especially. However, it was not intended to enter upon a discussion of this topic and these views are given simply as a suggestion of a theory.

THEODORE GARY, VICE-PRESIDENT,
International Interstate Association, Macon, Mo.

I SHOULD look on the scheme of attempts by the legislature to force two or more companies operating exchanges in one village or city to have a line connecting their two offices, so that patrons of one exchange can talk to the patrons of the other exchange as a Bell scheme, and from the present light I have, would certainly oppose such legislation.

I think full publicity should be given to this scheme in order to prevent its adoption in any State where the Independents have anything to say about legislation.

JOHN A. ARMSTRONG, PRESIDENT,
Louisville Home Telephone Co.

THE idea is absolutely impracticable; the interests being different, and there being no way of checking each other, it would only result in giving any community or State demanding such connections the poorest telephone service possible, and, in my judgment, such a law would impair rather than improve the service.

O. C. SNYDER, GENERAL MANAGER,
Kansas City Home Telephone Co.

THERE are many reasons why this would be a very harsh measure, so far as those Independent telephone companies are concerned that have modern and efficient systems. It would be decidedly embarrassing to us to be obliged to exchange service with other telephones in this city, owing to the fact that our plant is of the very best construction and our service of the same standard. It can easily be seen that, if we were obliged to connect with the exchange of our competitor here, we would never be able to give good service where we had to connect with their lines.

All the advantages of competition would, for this reason alone, be lost.

There is, however, one phase of the business which does require radical measures to stamp out; it is rate discrimination.

Richard Valentine, of Janesville, Wis., president of the Independent Telephone Association of Wisconsin, recently introduced a bill into the legislature of that state, which was passed, that remedies this state of affairs. That the Bell company recognized the deleterious effects it would have upon its business, was made evident by the strenuous efforts it put forth to prevent its

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WISCONSIN BILL TO PREVENT UNFAIR RATES.

A bill to prohibit discrimination in the charges of telephone rentals in different cities and villages, and fixing a.... penalty for the violation thereof.

The people of the State of Wisconsin, represented in Senate and Assembly, do enact as follows:

Section 1. There is hereby created and added to the statutes of 1898 a new section to be known and to read as follows: Section 1791a-1. It shall be unlawful for any individual, company, partnership or corporation, owning, controlling or operating telephone exchanges in two or more cities or villages of this State to charge any individual, company, partnership or corporation in one city or village a greater or a lesser rental for exchange telephone service than he or it charges any other individual, company, partnership or corporation residing in any other city or village of the same class, as defined herein, for like telephone service. It shall be unlawful for any individual, company, partnership or corporation, owning, controlling or operating telephone exchanges in cities and villages of different classes, as herein defined, to charge a higher rental for exchange telephone service in any city, or village, of a lower class than he or it shall charge for a like service in any city, or village, of a higher class. For the purpose of this section, cities and villages shall be classified as follows, according to the last preceding State or Federal census, to wit:

Cities of the first or highest class, those above 100,000 population.
Cities of the second class, 75,000 to 100,000 population.
Cities of the third class, 50,000 to 75,000 population.
Cities of the fourth class, 40,000 to 50,000 population.
Cities of the fifth class, 30,000 to 40,000 population.
Cities of the sixth class, 25,000 to 30,000 population.
Cities of the seventh class, 20,000 to 25,000 population.
Cities of the eighth class, 15,000 to 20,000 population.
Cities of the ninth class, 10,000 to 15,000 population.
Cities of the tenth class, 7,000 to 10,000 population.
Cities of the eleventh class, 5,000 to 7,000 population.
Cities of the twelfth class, 3,000 to 5,000 population.

This section shall not apply to telephone exchanges owned, controlled or operated by any individual, company, partnership or corporation in cities or villages having a population of less than three thousand according to the last State or United States census: Any individual, company, partnership or corporation violating or failing to comply with any of the provisions of this act shall, for each and every such violation or failure, forfeit not less than fifty dollars nor more than five hundred dollars, one-half thereof to belong and be payable to the person prosecuting.

Section 2. This act shall take effect and be in force from and after its passage and publication.

being enacted. We herewith quote from Mr. Valentine's letter to the editor in which may be found a few references to this condition of affairs.

"The Bell Telephone Company fought the bill in every possible way. It maintained a paid lobby at Madison constantly, and some of the time had as many as eight lobbyists there. The meanest work done against us was by some little Independent telephone companies that had lately become Bell sublicensees. The Bell company seems to own them body and soul, and when their owner tells them to dance they do it with vim. The bill passed the assembly by a vote of 57 to 28 and the senate by 14 to 13, several of the Senators being paired. The Bell attorneys made extended arguments against the constitutionality of the bill, and we consented to have it referred to the Attorney General for his opinion thereon, and which he rendered strongly in our favor.

So far the Bell company has paid no attention to the law, and probably will not until suit is brought. This we will attend to ere long."

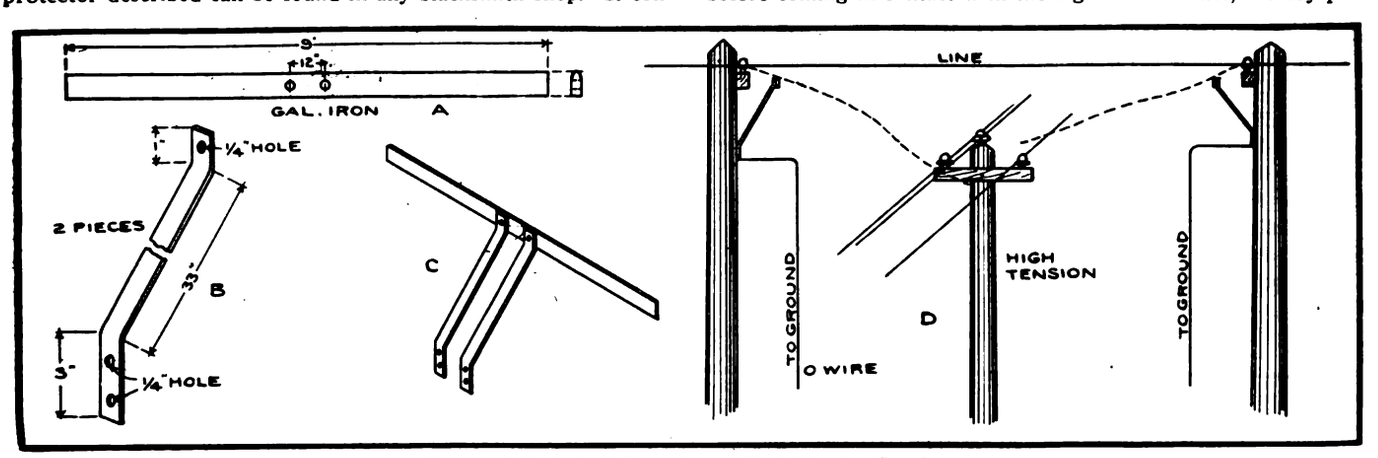
In Wisconsin as elsewhere the Bell company has formed the habit of cutting rates and giving free service in towns where it met competition; evening up elsewhere, by raising the rates in non-competing towns. In other words, it has made the people in towns where there was no Independent competition pay the piper for the loss at other points.

This Wisconsin bill does away with all this and compels a company to charge uniform rates for service in towns and villages of the same size.

Protection at High Tension Crossings

By C. S. Bundesman.

MANY companies will avail themselves of protection against crosses with high tension circuits, providing its cost be small. The following method was designed to meet economical requirements. The material necessary to construct the protector described can be found in any blacksmith shop. It consists of the following: One piece of iron 9 feet long, 1 inch wide and ⅜ inch thick. (It should be made as at *A*. The diameter of the pole controls all dimensions, therefore none are given.) Two pieces, 36 inches long, 1 inch wide and ⅜ inch thick, bent and drilled, as shown at *B*. When assembled these should look like *C*. This is mounted on each pole spanning the high current lines and is connected with earth with a piece of No. 0 wire, as shown at *D*. If a telephone wire spanning the high tension line should break it will allow the wire to slack and thoroughly ground itself before coming in contact with the high tension lines, thereby protecting the telephone instruments on both sides of the ground. The dotted lines in *D* show the course taken by a wire after breaking. To insure a good contact the piece of iron forming the ground connection represented in the accompanying illustration, must be protected from corrosion by galvanizing.



Suggested Method of Protection at High Tension Crossings.

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IN THE OPERATING FIELD.

EVIDENCE OF INDEPENDENT SUPERIORITY IN THE STATE OF OHIO.

THE following letters addressed to Jas. B. Hoge, president of the National-Interstate Association, are of particular interest, inasmuch as they offer proof of the superior service given by the Independent long distance lines, and also refute a detrimental financial statement.

James B. Hoge, Esq., Cleveland, O.:

Dear Sir—As you are no doubt aware, this company tried the experiment of allowing the Central Union or Bell Telephone Company to connect up its wires with the two principal exchanges of this company. The reason this was done was that we had heard so much about the benefits our company would derive, etc. We were anxious to do whatever was for our best interest and prevent possible competition. The connection was made on May 9 and continued until July 18. We tried to give the matter a fair and exhaustive trial. All our subscribers were advised of the connection and allowed their choice of service. We found that nearly 90 per cent wanted the Independent connections, and that we could reach many more stations over the Independent line than we could over the Bell lines.

During this entire period we had but very few calls for points reached exclusively by the Bell, and had several dozen calls that could not be reached over the Bell line.

After carefully considering the matter from every side, we were forced to come to the conclusion that the connection was of no benefit to our company. Much to our disadvantage and annoyance in many ways, even had it been possible for us to have continued the connection between both the U. S. lines and the Central Union or Bell lines, we ordered the connection severed. We did this with a full knowledge that the Central Union or Bell Company would put in an exchange and make us what trouble they could.

With our best wishes for the future success of the Independent telephone movement in Ohio and elsewhere, we are,

Yours, truly,
A. A. WHITNEY, President.
MARK COOK, Secretary.
Morrow County Telephone Company.

Mt. Gilead, Ohio, July 19, 1905.

Mr. J. B. Hoge, President National-Interstate Telephone Association, Cleveland, O.:

Dear Sir—Referring to your recent inquiry based upon a story in *Finance* relating to telephone conditions in Jasper, I have just received a communication from Wm. D. Curll, Petersburg, vice-president of the ninth Independent telephone district, upon that subject, which I quote for your information:

"I am in receipt of your favor of recent date enclosing clipping from *Finance*, in which it refers to local conditions at Jasper. I have just now sent the matter on to my assistant in that county, Mr. Hugo C. Rotheert, of Huntingburg, Ind. He is a very heavy stockholder in the Dubois County Telephone Company and a stockholder and a director in our company. Also cashier of one of the banks in his town. Now without having a report from him I will say that I know the item to be a lie out of the whole cloth. For the Dubois company is paying good dividends. Just a few days ago Mr. Frank Joseph of Jasper, Ind., cashier of the Dubois County State Bank, and a man of wealth and reputed a good financier, purchased ten shares of the stock in my company, and this week we had another call for stock from Jasper. Further, our plant has never been bonded, and we have a standing offer from monied men and the banks in Dubois County that when we do bond it, that they want to take the entire issue. So to my mind this is the best evidence that what is said in the article is a lie. Then I am told by officers of the Dubois company that its stock is selling at a small premium."

Yours truly,
GEO. W. BEERS.

FORT WAYNE, Ind., July 21, 1905.

INDIANA COMPANIES DENY RUMOR OF SALE.

ACCORDING to advices sent out by officers of the Independent telephone companies in Indiana, the Bell Telephone Company has been issuing misleading reports concerning purchases of certain lines belonging to Independent companies in the State.

H. B. Sale, manager of the Home Company of Indianapolis, stated in a recent interview, that Bell agents have been traveling over the State pretending to negotiate for a number of Independent plants and then spreading reports that this or that plant was about to sell. The purchases of control in the United Company and in the Frankfort plant are the only purchases made by the Bell people in Indiana within four years, and have been used to base a scare rumor to the effect that Independent plants can be bought at wholesale.

THE LATEST IDEA IN TELEPHONE DIRECTORY PUBLICATION.

PROBABLY the most unique telephone directory ever published has recently been issued by the Pine Bluff, Ark., Telephone Company. It is designed in the form of a monthly magazine and is entitled "Everyone's Magazine." The forepart of the publication contains a complete revised list of subscribers to the company interleaved with local advertising. The second part is devoted to topics of particular interest locally, and the world at large. The first article deals with the application of the Southwestern Telegraph & Telephone Company (Bell)

CONTRIBUTIONS SOLICITED

THE AMERICAN TELEPHONE JOURNAL is always in the market for crisp, snappy news or technical contributions. Descriptions of ways to do things telephonic, illustrated with sketches, and also descriptions accompanied by photographs are especially acceptable and will be paid for. Literary skill is not essential, but is, of course, appreciated. Send your sketch, photographs, and write the matter as well as you can. It will be dressed up, if necessary. Here is an opportunity for telephone men from engineers down to ground men to increase their incomes. An article cannot be too technical nor too elementary for us to consider. Articles illustrated with photographs are particularly desirable and will be substantially acknowledged.

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for the granting of an ordinance which, under cover of laying its wires underground, gives it the right to operate a system for forty years. The author of the article points out that a franchise such as this is of value to the city, and if granted should be paid for. The second article, by Geo. W. Buchanan, the editor, is entitled "Advertising Instruction," and deals with the typographical arrangement of advertisements and the decoration of show windows. Other items of merit are a description of New Zealand with photographs, short articles of interest respecting prominent people and several short stories. The volume closes with several pages of interest to ladies, including designs of the latest ideas in dresses. The latter part of the publication contains several pages of foreign advertising. The editor, Geo. W. Buchanan, is also secretary and manager for the telephone company.

A page advertisement in the Pine Bluff Co.'s directory.

In the compilation of this directory the magazine section is secured from a syndicate in St. Louis at a low cost. The directory and home advertisements are added locally. These more than pay for the cost of publishing the directory, which is also kept up to date by the monthly editions.

HOME COMPANY OF LOS ANGELES DENIES DESIRE TO CONSOLIDATE WITH BELL.

THE Home Telephone and Telegraph Company, of Los Angeles, Cal., in a published statement, denies that it in any way contemplates consolidating its system with the Bell company. Friends and patrons of the Home Telephone Company have been requested to sign and otherwise lend their aid to a petition which purports to be in the interest of the people at large, stating that the signers of this petition would favor a consolidation of the two telephone systems in this city, and that in the opinion of the signers the two companies should be consolidated into one. This has led to the inference that the Home company was about to consolidate its plant and system with its opposition in Los Angeles.

The Home company has every reason to believe that the petitions are being circulated by its enemies for the purpose of defeating the Independent or Home company from obtaining franchises in the city of San Francisco and in other places throughout the Pacific coast, and that these petitions, which are in many cases innocently signed, will be used to the detriment and to the disparagement of the Home company. The Home company points out that the effect of such petitions will be to prevent competition in other parts of California, and that besides there are legal reasons which absolutely prevent such a consolidation, even though it was desired.

THE BELL TELEPHONE COMPANY FALLING BEHIND IN INDIANA.

WHEN the Indiana State Tax Commission closed its first session July 29, it gave out a schedule of assessments of the valuation of telephone property in Indiana which plainly indicates that the Bell properties are falling behind in Indiana. Under the Indiana law, telephone property is assessed for taxation upon its valuation per mile, the estimate being based upon the character and quality of the property, its earnings, etc. This report shows a large decrease in the valuation of Bell and a substantial increase of Independent properties. The assessment of the Central Union Telephone Company has been reduced from $54 to $40 a mile, making a total decrease in the valuation of Central Union property of $813,000. The valuation assessment of the Cumberland Telephone Company doing business in southern Indiana, was decreased from $60 to $50 a mile, while the American Telephone and Telegraph Company remains the same as last year, $40 a mile.

In striking contrast the Board found sufficient prosperity and general superior equipment among the Independent companies to materially increase the assessed valuation of their properties. The New Long Distance Telephone Company's valuation was increased from $30 to $40 a mile. The Delaware and Madison County Telephone Company from $105 to $135 a mile; the South Bend Telephone Company from $90 to $100 a mile; the Logansport Home Telephone Company from $30 to $35 a mile.

HE "HELPS HIMSELF" TO THE PAPER.

ONE of THE AMERICAN TELEPHONE JOURNAL'S subscribers in California complains that he does not receive his paper regularly at his residence and asks that his address be changed to that of his business. In explanation he says that there is a "Bell" man living in the same flat and intimates that the Boston disciple "is helping himself." It seems that they can't get along without the A. T. J.

A WARNING

IMPORTANT NOTICE REGARDING THE GENERAL ELECTRIC SECURITIES CO., OF ST. LOUIS.

In the course of business, this paper received and published an advertisement of the above company. Recently we learned that it is doubtful whether this company is in a position to be of benefit to our readers. We have, therefore, discontinued the advertisement, and desire to withdraw any shadow of indorsement that may have appeared to have gone with its publication in our columns, and we assume no manner of responsibility as to the reliability or standing of the company.

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THE EDITOR'S PAGE

THE TELEPHONE DURING RAILROAD STRIKES.

THE strike of the telegraphers of the Great Northern and Northern Pacific railroads has forced the officials to place a new value upon the telephone. It is no longer regarded as a mere adjunct to the telegraphic equipment, but as its full equivalent. The continued running of the road, the fact that time schedules were duly kept and the elimination of all risks to passengers or freight, can only be attributed to a fuller and more intelligent use of the telephone than heretofore. In connection with such conditions, it may be stated that railroad companies dependent upon but one solution of so vital a problem, are in danger, at all times, of being commercially isolated. Provision for such contingencies may be made by developing at once a telephone system operating on parallel lines to the telegraph equipment.

A study of railroad practise shows a strong adherence to conservatism, particularly with respect to the employment of signals and dispatches. The difficulty in part consists of a refusal to disturb the established order of things. It is due to the difficulty anticipated in retraining the employes for new duties. Improvements appear in rolling stock, locomotives, lighting and rails, but they are slow in materializing in other respects.

Legal enactment should be sufficiently comprehensive to compel provision to be made, so that, pending arbitration or settlement of strikes the public are neither delayed nor placed in jeopardy of their lives. Perhaps this tardy recognition of the telephone as a means of carrying out the requirements of the road may lead to its more widespread adoption, in advance of trouble, by other systems. It seems that it has ceased to be an adjunct, as we have stated, to the telegraph sounder. During moments of great necessity, it rises to the highest plane of utility. It only remains to be seen whether this fact is so widely recognized that it will be made use of in time.

IMPEDANCE OF MAGNETOS.

RINGING up by means of a magneto involves the generation of an alternating current, its circulation through the line and its action upon the signal bell it is to operate. A few features of interest are to be noted in connection with this process. They relate mainly to the character of the current and the amount of inductance present in its path. A magneto will not send much current through a medium sized coil. It cannot send any current through a large sized coil. In using the magneto for the testing of grounds in the fields of a large central station generator it was found impossible to make the magneto ring. The impedance developed in the coil, as was afterward ascertained was the cause of this phenomenon. It appeared as though the circuit was incomplete and no current could pass. In the use of the magneto for a purpose similar in kind, though not in degree, inductive lines would develop sufficient impedance under certain circumstances to become useless for signaling. The fault can lie in the construction of the armature of the magneto as well as in the line and its appurtenances.

A far reaching magneto, is necessarily one built to produce a comparatively high voltage. A great many turns of fine wire are required on the armature to attain this object. The number of ohms it can ring through is thus merely a measure of the potential it can generate. But the greater the armature turns the greater its own inductance in consequence. The increase in this respect should be met with a lower frequency from the armature. Otherwise the reaching power of such a device becomes self limiting. High tension and therefore high wound spark coils have a slow make and break. It is difficult if not impossible to follow this form of construction with a too rapid interruption. The same principle holds true in the magneto. A great deal of its impedance would be eliminated by a slower rate of reversal. But if this were the case the ringing would cease to be a vibrant tinkle. It would be necessary to develop the bell into a single blow gong. Yet under ordinary circumstances, where the ringing current does not emanate from a central source, unusual line conditions or disturbances would then affect the reaching power of the magneto. With increasing pressure and impedance it seems as though a lower frequency would be very desirable.

TELEPHONE CURRENTS AND VOICE TONES.

THE extent of the variation of current in a transmitter and its effect upon the secondary are subjects of importance in telephone construction. It has been calculated, that only a small percentage of the energy of the voice is required to produce audible speech in the receiver. It has been discovered that the value of the current producing this succession of sounds is infinitesimal in comparison with that operating the transmitter. With what are called single contact microphone transmitters the value of the current in the secondary has been estimated to be between .0001 and .0007 of an ampere. With that type of transmitter called the granular or multiple contact microphone, the volume of current in the secondary lies between .0002 and .001 of an ampere. In either case the amount of difference in the volume of current and its own variability depend upon conditions which relate to the induction coil itself, the state of the battery and the volume of sound striking the transmitter. Newer forms of transmitters, when tested have been estimated to produce a current of about .01 of an ampere in the secondary, but this is heavier than a general average would seem to indicate. The point of importance with respect to telephone currents and voice tones is therefore that of trying to get the greatest current variation for the least tonal variation. This is what is regarded as an evidence of delicacy in construction, and is often quoted as a feature of the highest importance when comparative tests are made.

But there are other considerations, unique in themselves, which demand attention in this respect. Loudness is secured in telephonic devices by the use of certain vowels in lieu of others. Some vowels produce relatively intense sounds after conversion through the transmitter, induction coil and receiver. Others are weak, however great the vocal effort made. The enunciation of the letter e is productive of a current, very much less in strength than that arising through the enunciation of either a or o. These vowels are employed so extensively in the English language that the inequality in the impulses of current produced in the telephone frequently amount to gaps in the current equivalents of the sound conveyed. It seems as though provision should be made to meet conditions where enunciation is lacking by a study of the transmitter from this standpoint. Delicacy in microphones does not imply either distinctness or carrying power unless the voice is peculiarly adapted to it. The loud reproduction of faint or inaudible sounds is really only the reproduction of some of the sounds. Increased power for certain voice tones is necessary in the further improvement of telephone transmitters. Analysis can be carried out along these lines of reasoning with a definite, practical and directly applicable purpose in view, that will make possible the ready indentification of all voice tones with their known peculiarities and thus form a basis for future development of transmitters.

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The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

MORTGAGE OF LINES.

What right has a telephone company to mortgage its franchise or lines to raise money for new equipment? If a mortgage is given should it be a real estate or chattel mortgage? C. L. T.

TELEPHONE companies have no power to mortgage their franchises, lines or property, unless such power has been expressly conferred upon them by statute or by their charters, and a mortgage without such power is wholly void. U. S. v. W. U. Telephone Company, 50 E., 28. The poles and wires of a telephone company, when in position, constitute a part of the realty and must therefore be covered by real estate mortgage. Vane v. Newcombe, 132 U. S., 220.

TELEPHONE LINES AND MECHANICS' LIEN LAW.

Are the poles and wires of a telephone company subject to a mechanic's lien for poles furnished to the company, and for labor performed upon the poles? We think the public nature of a telephone company ought to exempt it from the operation of the mechanic's lien law. Have there ever been any decisions covering this point?

A TELEPHONE company is not of such a public nature, although it is for the benefit and convenience of the public, as will exempt its property from the application of the mechanic's lien law. The poles and wires of such a company have been decided to be an "appurtenance" to the premises and subject to a lien for labor. Wires and insulators have been declared to be "fixtures" and likewise subject to a lien for labor. Joyce on Electric Law, Section 1015.

GRANT OF RIGHT OF WAY.

AN action was brought against the American Telephone and Telegraph Company in Spartanburg county, South Carolina, by one Zimmerman to recover damages to plaintiff's lot by reason of defendant's construction of its line from the same. Plaintiff received a verdict for $300. The telephone company showed, in defense, a grant giving it permission to erect a line "from and along the property which I own or in which I have an interest," with a right to place poles along the highways adjoining the property.

In the complaint the plaintiff alleged that the agreement was signed with a distinct understanding that only one pole was to be placed on his land and that on a different part of the lot from where the line was constructed and placed where the poles and wires would not interfere with the lot for building purposes and plaintiff offered parol testimony to show the same. The court held that the grant referred to did not give the company the right to erect a line diagonally across the plaintiff's lot. The court held it proper to admit testimony which the plaintiff offered as to the verbal agreement and affirmed the verdict in his favor. Zimmerman v. American Telephone and Telegraph Company, 51 S. E., 243.

LIABILITY FOR BREAKS IN INSULATION.

THE Supreme Court of Nebraska granted a re-hearing in the case of the New Omaha Thompson-Houston Electric Light Company v. Dent, but did not reverse its former judgment. It held that whether plaintiff, a lineman experienced with telephone and telegraph wires, had such knowledge and experience respecting the handling of wires charged with heavy currents of electricity, used for lighting and power purposes, and of the character and pliability of the insulation thereon, as to its being brittle and liable to break when twisted in fastening because of age and wear, and whether he acted without due care and caution under the circumstances and was chargeable with contributory negligence; was not so conclusively proved that there was no chance of different minds reaching different conclusions. The case was therefore properly submitted to a jury for determination. The court also held that a break occurring in the insulation of the wire, which was being handled and fastened around a glass insulator by the deceased lineman, was not an open and obvious defect, notice of which would be imputed to him. New Omaha Thompson-Houston Electric Light Company v. Dent, 103 N. W., 1091.

REFUSAL OF SERVICE UNDER TENNESSEE STATUTES.

AT Memphis, Tenn., the Cumberland Telephone and Telegraph Company is made defendant in two damage suits filed in the Chancery Court for $10,400. In one case Charles LeVasseur, a civil engineer in the employ of the United States Government is the plaintiff, while in the other the firm of LeVasseur & DeBeaughen, civil engineers, are complainants. The actions are based on the provision of the Tennessee statutes, which make a telephone company liable for damages in the sum of $100 a day for each day it refuses to furnish proper connections to any party willing to pay for the service and comply with all the rules of the company. A controversy over the payment of a bill contracted by Mr. LeVasseur while in the government's employ is the cause of the trouble.

Mr. LeVasseur avers that, despite the fact the tolls, which were marked "O. K." and audited and approved by the Mississippi River Commission, were paid by the United States Government, the company persists in demanding payment from him, and refuses to give him service at his home until the other bill has been paid. He declares he is willing to pay for the services and to comply with all the rules of the company, and knows no reason why he should not have the service. It has been eighty-five days since service was refused him, and he asks for damages in the sum of $8,500. It has been nineteen days since his firm applied for service, and asks for $1,900 damages. The bill also contains a request for a mandatory injunction compelling the defendant company to give him service at once.

TO COMPEL INSTALLATION OF CUMBERLAND INSTRUMENT.

THE suit of M. D. Swayze, a butcher in the new City Market, against the City of Monroe, La., to compel the city to allow him to put in a Cumberland telephone, has been brought to trial. The city refused to give permission to stall renters in the market to put in Cumberland telephones. This suit was a result. The city furnishes a telephone of the Home Telephone Company with each stall. Decision has not yet been made.

PATENT FOR MICANITE.

THE United States Circuit Court for the district of New Jersey has recently had under consideration the Dyer patent, No. 483,646, for a process of making artificial micanite sheets for electric insulation, called "'micanite," by uniting a series of layers of irregularly shaped mica scales, laid to overlap, by means of varnish, under pressure, until a sheet of the required thickness is formed. The court held that this patent was not anticipated and disclosed patentable invention.

Mica Electric Co. v. Union Mica Co., 137 F. 928.

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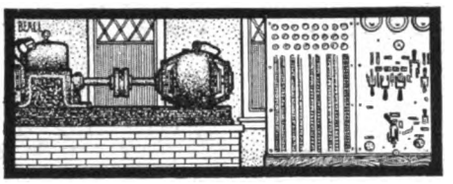
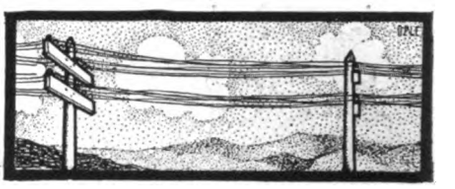


QUERIES

Questions on any subject relating to telephony will be answered on this page.



WIRE CHIEF'S TEST CIRCUIT.—(588.)

Will you please show me how to wire a wire chief's test set to be used with a magneto switchboard, using a voltmeter with a high reading scale only. T. V. P.

PLATINUM points which should be provided for on all make and break keys. All keys with the exception of the ringing key should be operated by means of a cam lever. The ringing key should be of the regular button, self restoring key type.

The first key (Fig. 588) is reversing, and is used in connection with all the others for locating trouble on the line or testing either side of the line. No. 2 key is the ringing and 3 the listening key which, when the operator cuts off the other five keys, allows the wire chief to go in on the line, that is up for test, with his receiver and induction coil.

No. 4 is the grounding key and is used to ground the other side of the line when testing with the voltmeter or sounder. The voltmeter should measure 45,000 ohms and have a scale from 0 to 30, divided so that each volt can be measured down to one-tenth of a volt. The fifth key is the voltmeter key which when it is thrown, will connect a grounded battery and voltmeter to one side of the line. The sixth key, when operated, cuts a 100 ohm non-inductive resistance coil directly across the voltmeter terminals, which causes the resultant readings to be milliampers instead of volts. The seventh key is the sounder key and is used to draw the attention of the wire chief when it is set on a line upon which the linemen are working; the click of the sounder being the signal. This saves considerable time for the wire chief, who would otherwise have to pay strict attention to the voltmeter. The sounder is also used to locate grounded or open wires inside or outside of the exchange. By setting this key, then by opening or shortcircuiting the line at the arrester head, the wire chief can judge by the clicks of the sounder where the trouble is. Another great advantage of this sounder is that it will locate swinging grounds, short circuits and crosses. A test line can be ordered up and the sounder lever connected for an hour or two. The click of the instrument will notify the wire chief of the swinging trouble.

Key No. 8 is one of the most valuable of all. When this and the listening key are thrown, one side of the receiver is grounded. Then by operating the reversing key the tester can listen with a grounded receiver on one side of the line then on the other. With practice he can locate a ground or an open line within a few feet of the actual trouble. This is done by comparing the induction on one side of the line with that on the other side. For instance: supposing a certain line is reported to be in trouble, after the line was ordered up, the first step would be to operate the voltmeter key, if the needle on the voltmeter remains at zero it is an indication that the line side is clear; then by operating the reversing key the test side of the line can be tested for a ground; if this side shows clear the ground key should be operated and the line tested for an open; if the voltmeter needle does not operate now, it shows the line is open and the next step would be to determine just where the open is located. For this test the listening and receiver grounding keys would be thrown, which would connect a ground to one side of the receiver and the other side to the line. By working the reversing key the tester might notice that there was about twice as much noise or induction on one side than the other side, this is an indication that the line is open on one side about half way between the office and the substation. By referring to the subscribers card to see what route the line takes, the location of the open can be located to a nicety.

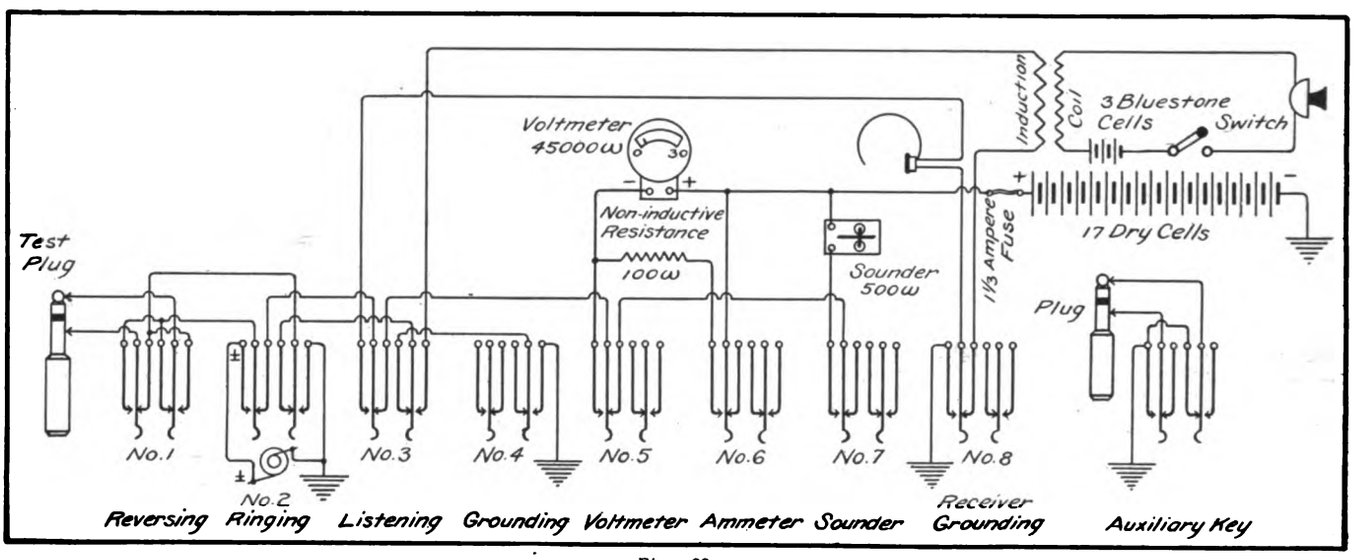


Fig. 588.

The auxiliary key is used in testing for a cross between two subscribers' lines. The two lines are ordered up for test, the auxiliary plug is connected to one line and the voltmeter test set connected to the other line. The sides which are crossed can be determined by operating the reversing and auxiliary keys.

CAN'T HEAR AT TIMES.—(589.)

I have a telephone on my route which is continually out of order. The parties claim they can't hear at times, yet I have been unable to find anything wrong. Can you suggest the cause of this trouble? INSPECTOR.

Examine the listening circuit carefully for loose connection or resin joint. Test the receiver cord and receiver terminals; also examine if possible the interior connections of the receiver. The trouble you have is termed a cut-out and may require some time to locate. The best plan would be to change the instrument entirely and have it tested at the shop, thus saving annoyance to the subscriber by frequent calls.

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Require the user to SIMPLY

DROP IN THE COINS

The Station Does the Rest

NO ELECTRICAL CONNECTIONS

Write for our book of Public and Measured Service Equipment

A PAY STATION WITHOUT LEVERS TO PULL OR SPRINGS TO DEPEND ON. INSURES THE MOST RAPID SERVICE WITH LOWEST COST IN MAINTENANCE.

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I am a traveling salesman for one of the representative manufacturers and have a franchise in one of the best towns in Illinois. "I'll" give it away without cost to good parties who will build the town. The only obligation, they must use my apparatus at market price. Town 6,000 population. Bell Company now has 400 subscribers. Independent toll connections to 80 per cent. of the State now up to the town. $250.00 forfeiture required for good faith Address, Franchise, American Telephone Journal, 1263 Monadnock Building, Chicago, Ill. 423

WANTED

Advertisements under this head 25 cents for 25 words or less for each insertion. Set in bold face type $1.00 per insertion for 25 words or less.

POSITION WANTED—Competent telephone man desires position with large telephone company. Can furnish best of references. Address Box 425, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 425

WANTED—Continued

WANTED—We want a first-class cable man. Permanent position for the right one. Address, giving full particulars, age, experience, references, salary expected, Johnstown Telephone Company, Johnstown, Pa. 434

WANTED—Young man as wire chief in exchange of 1300 telephones; also troubleman familiar with common battery work. Address Box 433, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York. 433

WANTED—First-class man for general superintendent of telephone plant in Southern city of 40,000 population. Must be fully competent to handle the operating, maintenance and construction. Married man preferred. Report September 1st for duty. Wages first year, $2,000. Address Box 436, care of AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York. 436

WANTED—First-class, experienced man as switchboard man and wire chief for 600 subscriber centralized call exchange. Must be competent to take charge of mechanical operation of exchange. Good salary for the right man of good habits. State age, experience and give references. Address Cairo Telephone Company, Cairo, Ill. 416

WANTED—Man used to wire chief's test table, testing lines and handling men. Also, switchboard construction men; men used to Kellogg system preferred. Give experience, references and salary wanted. Address Box 424, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 424

SUPPLIES WANTED.

WANTED—Stromberg-Carlson Central Energy Telephones. State price and conditions. Will pay cash for same. Address G. D. Archer, Electrical Manufacturer, Designer and Installer, 39 Cortlandt St., New York City. 432

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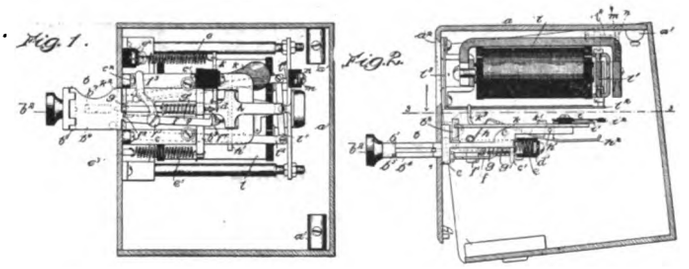
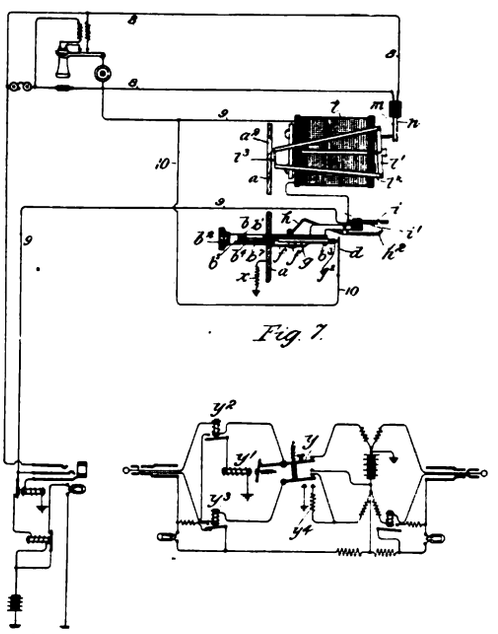
TELEPHONE PATENTS

TELEPHONE PAY STATION.

William W. Dean, Chicago, Ill., patents (No. 789,210, dated May 9, 1905, filed January 14, 1902 and assigns to the Western Electric Company); a toll box for telephone pay stations. With this device the subscriber deposits a coin to secure a connection to the exchange, the further disposition of the coin being at the will of



the operator. By referring to the drawings, Figs. 1 and 2 are sectional views of the mechanism and Fig. 7 a circuit embodying the devise. When a subscriber desires a connection a suitable coin is introduced into the sliding carrier *b*, causing the plunger to be pushed into contact with the insulated spring *d*. A circuit to ground is thus formed over line 9, which causes the line signal to be displayed. The party called having answered, the switch *y* at the central office is operated, which supplies current to the electro-magnet *l*, causing it to display a sign "Push button," and



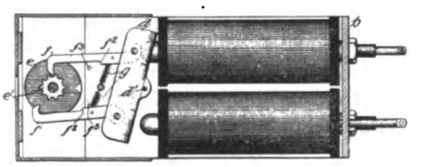
at the same time short-circuiting the subscriber's instrument at contacts *m n*. The armature also causes the stop k^2 to be removed, which normally prevents the coin carrier from being pushd in. The reversing switch *y* is locked in position by the relay y^1, which is included in a local circuit of the relays y^2, y^3. When the subscriber pushes in the coin carrier by button b^2 as far as it will go, the door b^4 is unlatched and the spring finger *h* throws out the coin. At the same time the end h^2 is forced into contact with the insulating point i^2 of the spring *i*, causing it to open its contact with i^1 and thus breaking the line circuit 9. The circuit of relay y^3 is thus broken, but the circuit of relay y^2 remains intact; thus the local circuit of the relay y^1 is closed and the reversing key *y* released, re-establishing the operative condition of the circuit. When the coin carrier returns to its normal position under the tension of the springs e e^1 the plunger *g* opens its contact with *d* and the apparatus is returned to its normal condition.

SELECTIVE SIGNALING.

Edward A. Buell, DeKalb, Ill., patents (No. 792,693, dated June 20, 1905, filed October 25, 1904, and assigns to the Selective Signal and Telephone Manufacturing Company); a selective signaling system. In the patent the inventor employs a wheel which has a number of projections upon its circumference and a handle to rotate it. This wheel operates to intermittently close a battery circuit for selective signaling.

TELEPHONE SERVICE METER.

Frank R. McBerty, Evanston, and James L. McQuarrie, of Chicago, Ill., patent (No. 793,389, dated June 27, 1905; filed November 19, 1902, serial No. 131,965, and assigned by mesne assignments to the Western Electric Company, of Chicago, Ill.); an improvement in telephone service meters. Its object is to automatically record the number of exchange connections at the central office switchboard. The record is not made permanently when the service has not been completed, where the line is busy or the party does not respond. A polarized electromagnet in a bridge with the subscribers' telephone line, operates the counting wheel of the service meter. The answering portion of the operator's cord circuit at the central office, is equipped with a relay which applies current of one polarity, to operate the meter when the answering plug is inserted in answering a call. If a



complete connection is not established and no charge is to be made the operator may apply by means of a switch, current of the opposite polarity and cancel the charge.

The sketch shows the operation of the device. The pull on one side or the other is controlled by the direction of the current as described.

TELEPHONE RECEIVER.

Theodore C. Brecht of Washington, D. C.; patents (No. 794,137; dated July 4, 1905; filed Sept. 22, 1902; renewed Dec. 14, 1904; serial No. 236,855; a telephone receiver.

In this device the object is to accentuate the sensitiveness of telephone receivers and to provide a means for the clearer and louder production of voice tones.

It consists of a core of soft iron facing a diaphragm. Upon said core are placed a multiplicity of coils whose first ends communicate with the line wire and their last ends with the battery employed. The inventor claims that the vibrations imparted from the diaphragm of the transmitter to the coils through the line are by this means made clearer and stronger.

TELEPHONE TRANSMITTER.

EMIL R. SNYDER patents (No. 791,657) an Improved Form of Telephone Transmitter. This transmitter is a deviation from the usual form of double diaphragm transmitters. As the principles involved are too complicated for an analysis in our columns we would suggest parties interested securing a copy of this patent.

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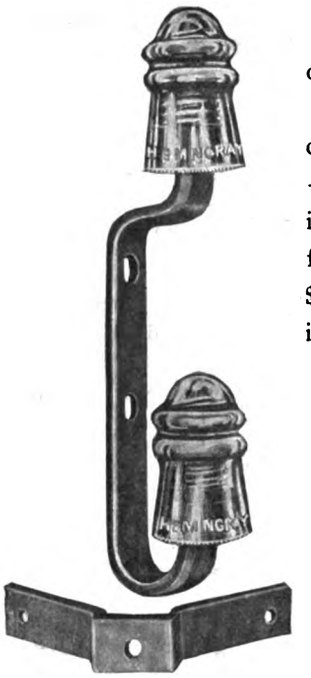
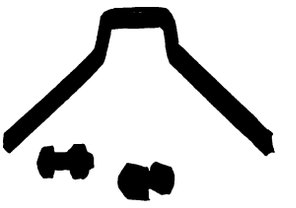


It supports service drops in every position.

It enables you to use cheap wire—no rubber—and gives you better insulation than you get from twisted pairs at $90.00 per mile. This is worth while.



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I was sitting in my office thinking about you and my anchor. I'd like to talk anchor to you because I have a practical anchor to talk about. Its cheap, strong and I know it will save you time and money on every pole guyed, besides does a better job. My "Bull Tongue" anchor grabs the solid mother earth and doesn't slip. It's low priced, ridiculously low, but I make money and it *will* save you money.

Booklet free.

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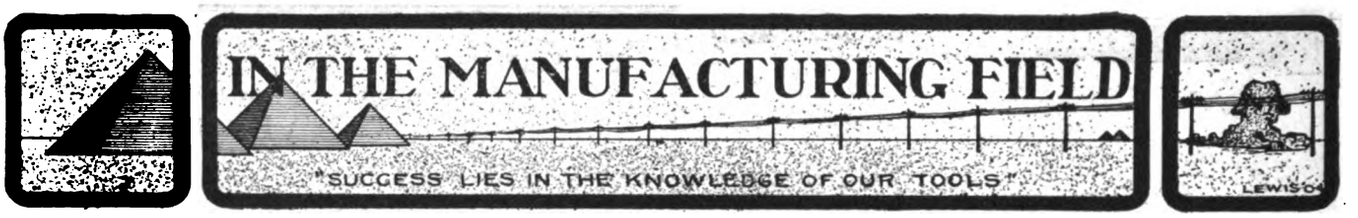
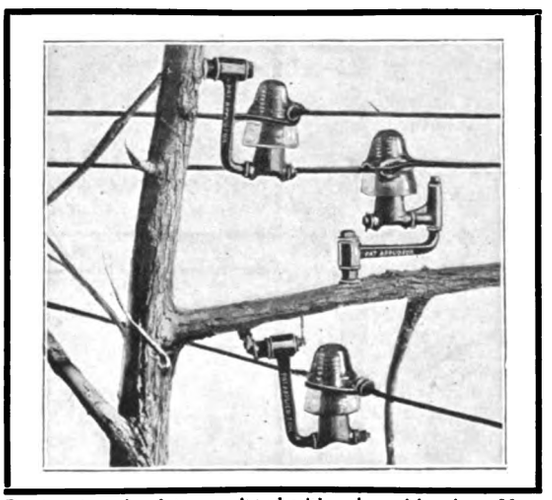


A NEW TYPE OF TREE INSULATOR.

IN stringing telephone lines recourse is often had to trees for support. In general practise it is customary to use either brackets or knobs, with the latter the suspension being by means of wires attached to the limbs, which are so arranged as to allow a flexible movement. Both these methods have their disadvantages, inasmuch as the extent of the movement of the tree, due to the action of the wind cannot be compensated for without allowing too much slack. To overcome this difficulty Dunton & Field, 117 Main street, Cambridge, Mass., have devised an attachment having universal bearings, upon which is mounted an insulator. Its construction readily permits it to be attached to the limbs or branches of a tree at any angle or position. The manufacturers claim that it is the only one that allows the wire to be tied in solid to the glass without injury to the wire or tree. It can be used on any size of wire, is made of malleable iron of the best grade. The glass is screwed on an ordinary locust pin entirely protected from the weather. This insulator will be found of great benefit in construction of rural and long service lines, as it does away with the setting of poles if trees are available for supports. A leaflet giving further particulars respecting this device will be sent upon request.



Dunton tree insulator equipped with universal bearings. Manufactured by Dunton & Field, Cambridge, Mass.

FRANK B. COOK, Chicago, Ill., has received orders for eight protector equipments, as follows: From the Automatic Electric Co.—For Wausau Telephone Co., Wausau, Wis., 700 prs.; for Hastings Ind. Tel. Co., Hastings, Neb., 600 prs. From the Kellogg Switchboard and Supply Co.—For the Surprise Tel. Co., David City, Neb., 500 prs. Also from the following exchanges: West Texas Tel. Co., Ballinger, Texas, 800 prs.; Pocomoke Tel. Co., Pocomoke, Md., 200 prs.; Westfield, Ill., 200 prs.; Benson, Minn., 200 prs.; York, Pa., 300 prs.; Litchfield, Minn., 200 prs.; Columbus, Neb., 300 prs.; Virden, Ill., 300 prs.; Girard, Ill., 300 prs.; Birmingham, Ala., 320 prs.; Princeton, Ind., 600 prs.

THE NUNGESSER ELECTRIC BATTERY COMPANY, Chicago, Ill., is distributing a card drawing attention to the qualities of the 1900 dry battery. It claims for this type cell strength and durability. Upon the reverse of the card are some timely remarks upon the power of determination; which point out that when one will readily say "I can't!" upon meeting an obstacle, the doubt is finally changed by perseverance into the determination to do expressed by the phrase "I will!"

THE BAIRD MANUFACTURING COMPANY, 24 Michigan street, Chicago, Ill., is manufacturing a secret service system by means of which telephone companies operating rural and party lines can give individual service to each telephone. The duplicate orders received by this company have been so heavy that an extension of their manufacturing facilities became necessary. The shipments of the secret service system are now facilitated by an increase in machinery and floor space amply sufficient to meet the present contingencies. This system is claimed by them to effectually reduce the cost of telephone maintenance, through the elimination of the wear and tear on the telephones, and drains on the batteries, due to the method of "listening in." The company believes the increased efficiency of service is so pronounced that subscribers will readily pay increased rental.

This system can be attached to any switchboard without cutting or marring its appearance, and without changing the wiring of any of the drops. The central office operator has absolute control of all lines equipped for such service. This system locks out all but the party required, and the feature that those thus isolated can in no way interfere with the conversation of the communicants is one of its essential characteristics. Locked out parties, however, can notify central, and in emergencies obtain ready service without disturbance to those engaged in conversation. As the operator has control of the lines, the lock-out of the parties using the line until the emergency call is finished is readily accomplished, then the former conditions are restored in the case of the original parties. Its booklet entitled "Secret Service on Party Lines," descriptive of this system, will be sent free on application.

THE DEAN ELECTRIC COMPANY, Elyria, Ohio., has recently secured the services of Geo. A. Scoville, a graduate of the electrical engineering course of the Leland Stanford University, of Palo Alto, Cal., as one of W. W. Dean's assistants in the engineering department.

Mr. Scoville's previous training in the art of telephony has been such as to fit him for this new position. Like many other Independent telephone engineers, he started in the Western Electric Company's factory at Chicago, and from 1898 to 1901 worked in its telephone switchboard assembling department, and acted as installer of telephone exchanges. Before leaving to complete his college course he was an assistant in its telephone engineering department. After graduating Mr. Scoville was connected with the Los Angeles Edison Company in its testing department, and just before joining the Dean force was again employed by the Western Electric Company, assisting in the installation of its latest switchboard equipment on the Pacific Coast.

THE ELECTRIC APPLIANCE COMPANY, Chicago, Ill., and San Francisco, Cal., is distributing a price leaflet of standard telephone cross arms. These arms are made from Washington fir in all sizes from 24 inch two pin arms to 120 inch twelve pin arms. This leaflet quotes prices from Chicago or St. Louis and also f. o. b. cars Minnesota Transfer. This price list will be mailed to parties in the market for arms.

WATERBURY & COMPANY, 69 South street, New York, are enjoying an increasing demand for their telephone cables. These are made in all sizes and with either paper or rubber insulation. The company will furnish quotations upon request or estimate upon specifications.

BRUNO GROSCHE & COMPANY, Lord's Court Building, New York, wish to draw attention to their S. P. F. Carbolineum wood preservative. This preservative has been on the market for 50

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SOLD ON QUALITY—NOT ON PRICE

Beyond Reasonable Doubt

The law says that to convict a man of a crime, his guilt must be proven beyond reasonable doubt.

We say that before a telephone is credited with being equal to Sumter, its equality must be proven beyond all reasonable doubt.

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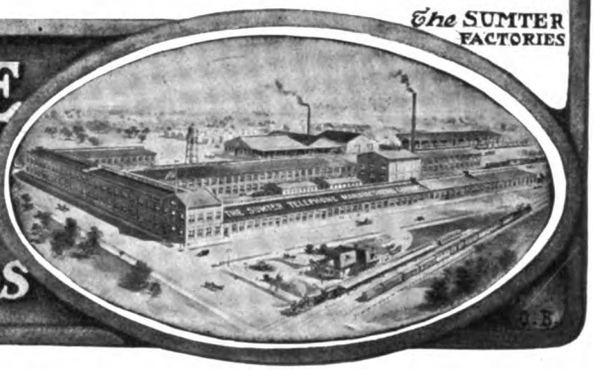

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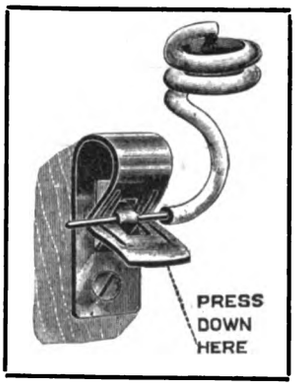

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all apparatus that we make. That is the reason why our apparatus is used exclusively wherever introduced. Candidly speaking, don't you think you had better investigate our claims before placing your next order elsewhere?

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years and is well known for its lasting qualities. The demand is constantly increasing, and those companies who contemplate the adoption of a preservative should write at once for price list and further information to prevent delays in shipment.

A NEW TYPE STORAGE CELL.

THE storage battery destined to take its place among the perfected inventions of the age will be one combining within itself certain high qualities, such as large storage capacity, durability and limited weight. In a technical sense the design of the storage cell, representing the results of Mr. William Morrison's analysis and experiments, expresses a close approximation to these requirements, and in consequence can be regarded as commanding in an equal sense the commercial success expected of it.

The features of interest contained in this cell represent mechanical and electrical means of overcoming all of the former objections to the storage battery. The aim of the inventor, as shown by the ingenuity with which the serious effects of buckling are avoided, the weight kept in check and the spongy active material permitted to exercise its full functions without limitation, indicates a full appreciation in a practical and theoretical sense of the difficulties to be surmounted.

Buckling, or the bending of plates, is avoided by a form of construction which permits each individual plate to be built up as shown in Fig. 1. The order in which the parts of the plate are assembled, as indicated by 1, 2, 3, 2, 4 and 2, etc., in this illustration is for the purpose of holding the active material so securely that it is obviously impossible for it to be dislodged through shock or vibration; to allow the ready escape of all

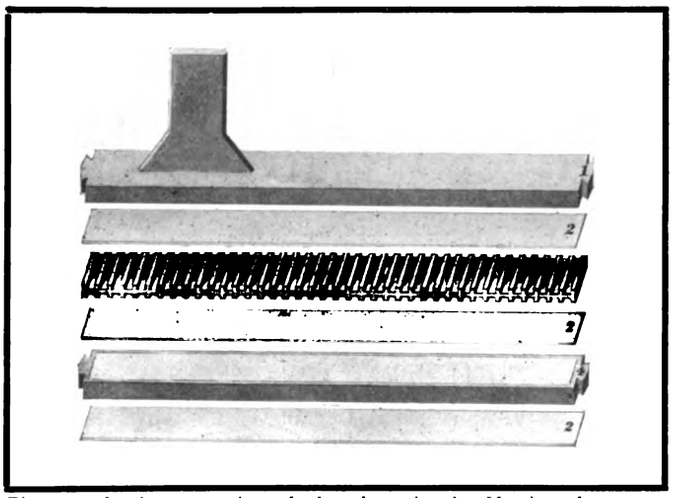

Fig. 1. Novel construction of the plates in the Morrison battery to prevent buckling.

gases, and to permit the solution to reach and circulate freely around the active material.

The active material cannot drop down between the plates and thus cause internal short circuits, because, as the design shows at 4 of Fig. 1, it is held around its edge by a metal containing strip, the ends of which are dove-tailed. On each side of this metal rimmed block of active material a porous strip is laid, 2 and 2, and on each side of 2 and 2 grooved strips like 3 are placed. The grooved strips, whose grooves are perpendicular to the surface of the plate, permit the solution and current to fully permeate the active material of 4.

The parts thus constituting a single plate, with the end dovetails projecting from each end of the sections of active material, and the massive top and bottom pieces are fitted into a dovetail groove of the two heavy side pieces. This construction thus composes a frame with which is secured the elements of Fig. 1.

This rigid frame resists the bending or buckling tendency, and it is obvious that the active material cannot move sideways from its casing. Solidity, strength, lightness, escape of gases and a large surface of active material are thus secured and combined. Tests made by Foree Bain, of national reputation, show a power capacity of 14 watts per pound total weight. The manufacture of this cell is being carried on by the Universal Electric Storage Battery Company, a Delaware corporation, with offices at 1355 Railway Exchange and factory at 36 and 38 Union Park place, Chicago. The president is A. F. Callahan; vice-president, Corwin H. Spencer; secretary and treasurer, J. S. Burnet. Mr. Callahan was known as the vice-president of the United States Cast Iron Pipe and Foundry Company. William Morrison, of Chicago, the inventor, supervises the construction and assembling of the cells, acting as expert and electrical engineer for the concern.

THE SCHAPER CONSTRUCTION MATERIAL COMPANY, Electrical Exchange Building, New York, is distributing estimate blanks which are proving a great help to companies building lines. This firm manufactures a full line of construction hardware and is prepared to quote attractive prices. Amongst other appliances which it has for sale are lag screws, fetter drive screws, marline hangers, pole steps, cross-arm braces, etc. The estimate blanks are furnished free upon request.

THE CENTRAL TELEPHONE AND ELECTRIC COMPANY, 2135 Lucas avenue, St. Louis, Mo., reports heavy sales for its Central

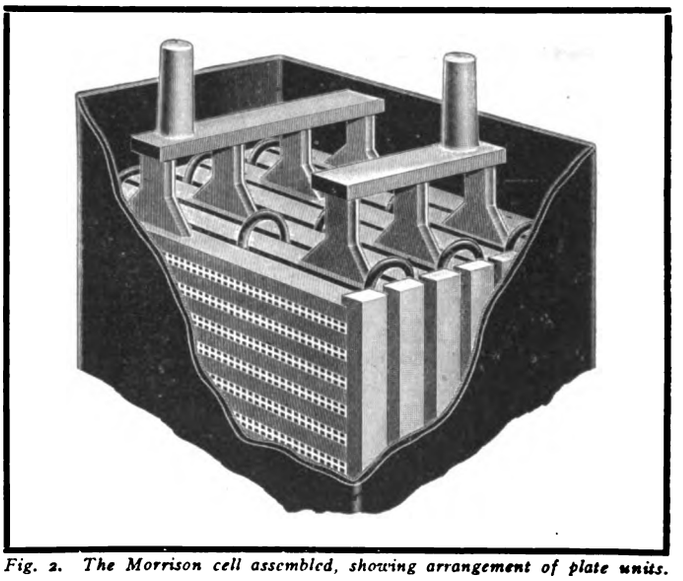

Fig. 2. The Morrison cell assembled, showing arrangement of plate units.

"Leader Junior" telephones. This type instrument is made after the general style of common battery instruments, except that the battery box and ringer mechanism are placed below the writing shelf. This arrangement makes a very compact instrument and one in which the parts can be readily examined. Sample instruments and further information will be sent upon request.

BAKER & COMPANY, Newark, N. J., report increasing demands for their refined platinum in sheet and wire, and also for the manufactured rivets and contacts. Wherever a circuit is to be made or broken, the contacts should be platinum to prevent corrosion, which greatly adds to the resistance of the circuit. The company especially recommends its contacts for all current carrying make and break devices. Literature dealing with the subject will be sent upon request.

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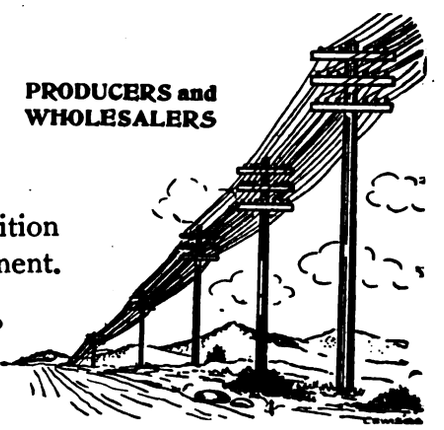

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Others are better, but the
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Are the BEST.

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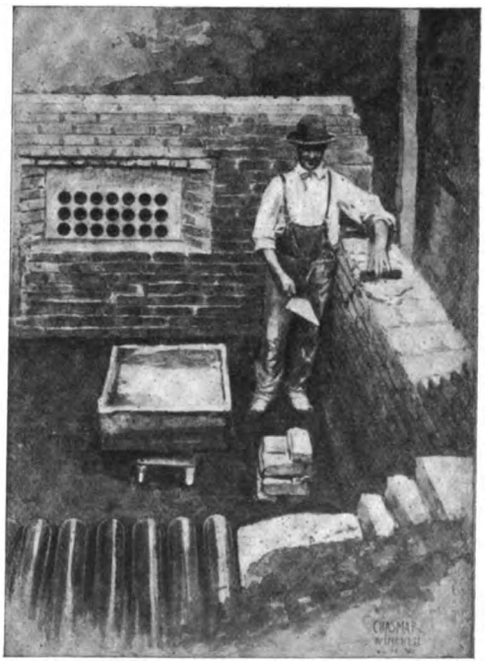
For Underground Construction



The American Conduit Company has a corps of experts in underground construction and is prepared to furnish supervision of work if desired. We would prefer to co-operate with contractors in underground construction, but if desired will submit estimates and bids and take contracts for completed underground systems in any part of the United States or Canada.

AMERICAN CONDUIT COMPANY,
Main Offices, 1005-6 Manhattan Building, Chicago
Other Offices, 170 Broadway, New York; 336 Macy Street, Los Angeles

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THE WEEK'S MESSAGES

FINANCIAL.

CONWAY, ILL.—The Home Telephone Company has increased its capital stock from $6,000 to $10,000.

GALESBURG, ILL.—The Union Telephone Company has increased its capital from $150,000 to $250,000. It will erect a new building to cost $10,000.

DALEVILLE, IND.—The Daleville Telephone Company has declared a semi-annual dividend of four per cent.

BELLEVUE, IA.—The Bellevue Telephone Company, Bellevue, has increased its capital stock to $5,000.

MINNEAPOLIS, MINN.—The directors of the Twin City Telephone Company have declared the fourteenth quarterly dividend of 1¾ per cent. on the preferred capital stock.

LYONS, N. Y.—The Wayne Monroe Telephone Company has increased its capital from $100,000 to $2,000,000.

FRANCHISES.

SPARTA, ILL.—Application has been made to the council at Sparta for a telephone franchise. Back of the movement are: G. K. Kobusch, J. C. McCoffy and H. B. Hawes of St. Louis, Mo.

CLARION, IA.—The Leatherwood Telephone Company has been granted a franchise at Clarion.

COMBINATIONS.

TRAER, IA.—J. H. Shoemaker has just purchased a half interest in the Traer telephone exchange, R. L. Parker holding the other half. The two gentlemen have also bought the Reinbeck exchange. Mr. Shoemaker is also one of the stockholders of the Corn Belt Telephone Company in Waterloo, which recently purchased the United States Company's plant.

CADIZ, KY.—C. R. Lackey and J. S. Lawrence, of Cadiz, Ky., have purchased the Globe Telephone Company, of Cadiz, and will rebuild the exchange recently destroyed by fire. The lines will be extended to cover Trigg County.

INDEPENDENCE, MO.—The plant of the Independence Home Telephone Company has been sold to Theodore Garey of Macon, Mo., vice-president of the National Independent Telephone Association. The consideration was $50,000. Mr. Garey, purchaser of the plant, is the owner of local independent telephone plants at Carthage, Joplin, Webb City, Nevada, Macon, Columbia, Mo., and Atchison, Kan.

BURLINGTON, VT.—The Franklin County Telephone Company has bought of W. O. Start, of Bakersfield, a private system. It will enlarge the system and establish several new exchanges.

ELECTIONS.

REDLANDS, CAL.—The Redlands Home Telephone Company has elected the following officers: President, K. C. Wells; vice-president, J. J. Prendergast; secretary and treasurer, J. H. Breckenridge.

CANANDAIGUA, N. Y.—The People's Line Telephone Company, of Ontario County, has elected the following officers: President, Hector W. Blake, Naples; vice-president and general manager, John Litzendorf, Honeoye; secretary, George B. Hemenway, Naples; treasurer, George R. Granby, Naples; directors, D. O. Pierpont, Richmond; E. C. Church, Canandaigua; R. B. Abbey, Richmond.

NAPLES, N. Y.—The Ontario and Steuben Telephone Company has elected the following officers: President, William Waite, Atlanta; secretary, George A. Bolles, Naples; treasurer, W. H. Housel, Naples. These are ex-officio directors. Additional directors are: D. D. Cottrell, North Coshocton; H. W. Blake, F. W. James and J. E. Lyon, Naples.

NEW HOLLAND, PA.—The Enterprise Telegraph and Telephone Company has elected the following directors: Dr. J. L. Winters, Goodville; Solomon High, Blue Ball; A. M. Cline, Terre Hill; I. G. Martin, Geo. W. Bair, Eli M. Martin, New Holland; Noah L. Nolt, Voganville; Harry M. Stauffer, Leola; J. G. Burkholder, Denver.

NEW COMPANIES.

MAGNOLIA, ARK.—The Magnolia Telephone Company, capital $15,000, has been chartered. Incorporators, R. L. Moore, J. G. Brown, Gus Kohn.

FOWLER, CAL.—The Fowler Independent Telephone Company has been incorporated with a capital stock of $7,500. Besides constructing a system at Fowler, it will build lines to Fresno, Del Rey, Selma and Lone Star. Incorporators: W. T. Crawford, P. W. Hastie, Thomas Aten, W. E. Marden, M. Brady and others.

SEWARD, ILL.—A telephone company has been organized at Seward with the following officers: Wm. Neely, president; Herva Cleveland, vice-president; C. S. Thomas, secretary; Frank Hollenbeck, treasurer.

HAVELOCK, IA.—The Havelock Mutual Telephone Company has been incorporated, with a capital stock of $28,000. Incorporators: W. E. Pirie and others.

KELLERTON, IA.—The Kellerton Mutual Central Telephone Company has been incorporated.

THREE RIVERS, MICH.—The Southern Michigan Telephone Company has been incorporated with a capital stock of $300,000.

SACRED HEART, MINN.—The Pommers Consolidated Telephone Company, Sacred Heart, has been incorporated with a capital stock of $50,000.

BRAXTON, MISS.—The Braxton Telephone Company has been incorporated with a capital stock of $1,500. Incorporators: L. D. Spell, J. H. Gibson, T. S. Neely and others.

CARL JUNCTION, MO.—The Carl Junction Telephone Company has been incorporated with a capital stock of $10,000. Among the shareholders are G. A. Welborn, M. C. Welborn and H. C. Robertson.

CONCORDIA, MO.—The Concordia Telephone Company has been chartered here by F. H. Kueck, A. W. Gurberdt, Henry Flicken and associates.

LAMAR, MO.—The Lamar and Barton Telephone Company has been incorporated with a capital stock of $40,000. Incorporators: J. W. Layne, J. B. McGilvray, E. J. Layne and others.

HARTINGTON, NEB.—The Cedar County Farmers' Telephone Company of Hartington has been incorporated with a capital stock of $5,000. Incorporators: A. H. Cressy, L. D. Greenwood and others.

BOGOTA, N. J.—The Rio De Janeiro Telephone Company, of Bogota, N. J., has been incorporated with a capital stock of $1,500,000. Incorporators: C. H. Sisson, Bogota, N. J.; Isaac Gilbert, Jersey City, N. J.; H. A. Robinson, Yonkers, N. Y., and others.

JERSEY CITY, N. J.—The Merchants and Miners' Telephone and Telegraph Company, 15 Exchange Place, Jersey City, has been incorporated with a capital stock of $500,000. Incorporators: Sidney R. Perry, J. L. Stewart, Jos. Gales, Jr., all of 15 Exchange place.

EASTON, N. Y.—The Easton Telephone Company has been incorporated with a capital stock of $2,000. Incorporators: Geo. Gifford, Allen Rathbun, Charles Gifford and others, Valley Falls.

CHAGRIN FALLS, O.—The Home Telephone Company has been incorporated with a capital stock of $20,000. Incorporators: T. F. Ryan, W. R. Nutt, J. T. Daniels, R. J. Brown and James Niven.

GREENVILLE, O.—The farmers of West Salem township have organized a telephone company to construct a line from Greenville to Kinsman, O. S. K. Parker is president of the company.

CLEVELAND, OKLA.—The Farmers' Central Telephone Company has been incorporated with a capital stock of $3,500. Incorporators are: E. W. Swallow, J. N. Ashbere, J. L. Hohsall, R. M. Bernard and others.

NARDIN, OKLA.—The High Point Mutual Telephone Company, of Nardin, has been incorporated with $1,000 capital. Incorporators: John H. Dickerman, J. W. Quillian, R. W. Swain and others, all of Nadin.

ENTREKIN, PA.—The Woodcock Valley Telephone Company has been incorporated with a capital of $5,000. It is to build a line from Entrekin, Lincoln township, Huntingdon County, to Williamsburg, Porter township, Blair County. D. M. Summers, of Entrekin, is the treasurer.

REVERE, PA.—The Nockamixon Telephone Company has been incorporated, and will install an exchange at Revere. President, W. O. Ealon, Kintnersville; secretary, Thomas L. Henry, Kintnersville; treasurer, T. N. Moyer, Ferndale.

WOODCOCK, PA.—The Woodcock Valley Telephone Company has been incorporated with a capital stock of $5,000. It is to build a line from Entrekin to Williamsburg. D. M. Summers, of Entrekin, is the treasurer.

ST. MATTHEWS, S. C.—The St. Matthews and Cameron Telephone Company has been incorporated, with headquarters at St. Matthew's. The corporators are J. E. Wanamaker, J. M. Moss and others.

CARPENTER, S. D.—The Carpenter Telephone Company, of Carpenter, has been incorporated with a capital stock of $25,000. Incorporators: Samuel Birks, William G. Campbell, T. L. Wood and others.

HUMBOLDT, S. D.—The Humboldt, Hartman and Wellington Tele-

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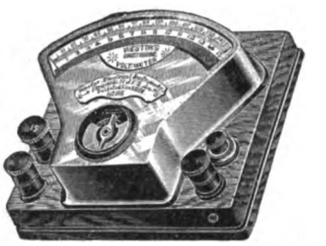

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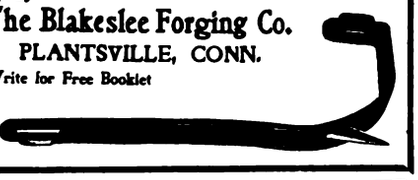

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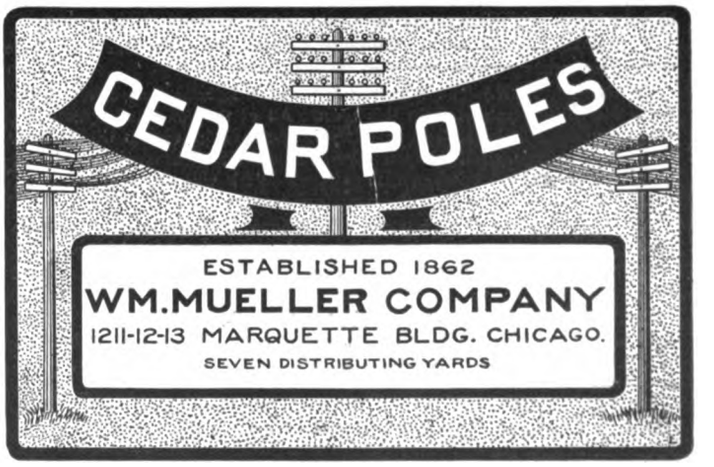

Please mention THE AMERICAN TELEPHONE JOURNAL when writing to ADVERTISERS.

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THE WEEK'S MESSAGES—*Continued*

phone Company, of Humboldt, has been incorporated with a capital stock of $10,000. Incorporators: John Hartman, George W. Ingalls, John Henpftling and C. T. Helmley.

TEXARKANA, TEXAS.—The Texarkana Telephone Company, of Texarkana, Texas, has been incorporated with a capital stock of $150,000. Incorporators: F. M. Marriott, Delaware, O.; W. P. Harrison, Fred E. Harrison, Cincinnati, O.; P. J. Eunanks, Columbus, O.; B. H. Kuhl, Hiram Glass, J. Huckins, Jr., Texarkana, Ark.

CRAIGSVILLE, VA.—The Craigsville and Bell's Valley Mutual Telephone Company has been incorporated with a capital stock of $5,000. J. B. Tuttle, president; D. Kunkle, vice president; L. E. Hicks, secretary and treasurer, all of Craigsville, Va.

WINCHESTER, VA.—The Appleridge Telephone Association has been incorporated with W. C. Graichen, president; R. T. Barton, secretary and treasurer, of Winchester. Capital $2,500. Objects, to purchase, lease or construct, operate and maintain a telephone line.

WINCHESTER, VA.—The Winchester and Jordan Springs Telephone Company, of Winchester, Va., has been incorporated with a capital stock of $5,000. L. R. Fay, president, Frederick County, Va.; H. H. Baker, treasurer, Winchester, Va.; H. P. Byrd, secretary, Winchester, Va.

WATERVILLE, WASH.—The Farmers' Telephone Company has been incorporated, with J. K. P. Carston as president and W. E. Gaskell as secretary.

MISCELLANEOUS.

BANNING, CAL.—The Southwestern Home Telephone Company, operating in Banning, San Jacinto and various other towns in that section of the state, is now connecting its lines with Hemet from the San Jacinto exchange. The company reports a large business between towns on its toll lines, and that the line between the new exchange and Los Angeles is doing a heavy business.

PEKIN, ILL.—The Interstate Telephone Company has connected with the Citizens' Telephone Company of this city, which gives Pekin a connection with Peoria.

FORT WAYNE, IND.—The Fort Wayne and Wabash Valley Traction Company has installed a new private telephone service between Fort Wayne and Logansport.

HUNTINGTON, IND.—Plans are forming for an independent telephone system in this city, to replace the United Telephone Company, which recently was absorbed by the Bell.

INDEPENDENCE, MO.—S. H. Woodson, president of the Independence Home Telephone Company, has denied the rumor, published in an Independence paper, that his company had sold the plant to the Bell Telephone interests. He said that no negotiations were on with the Bell people, and that the plant would never be sold to them.

LOWVILLE, N. Y.—The Black River Telephone Company has completed the construction of an exchange line and a toll line from Lowville to New Bremen.

JOHNSTOWN, PA.—The Somerset County Telephone Company has made a traffic arrangement with the Western Maryland Telephone Company whereby it will be able to reach a very much larger territory.

YORK, PA.—An ordinance now before city councils provides that any company which is granted the franchise to put the wires underground shall not be allowed to increase the rate to subscribers. If any company owning conduits shall lease to another company the right to participate in the use of the pipes three per cent of the rental must be given to the city by the parent company.

PERSONAL.

WILLIAM BEDELL has been appointed district manager for the Central New York Telephone Company at Syracuse, N. Y.

W. B. BLACKBURN has been appointed construction superintendent for the Central Union Telephone Company at Michigan City, Md.

J. E. COLTON has been appointed manager for the Union Telephone lines at Sharon, Pa.

A. L. KETCHAM has been appointed manager for the Rome, N. Y., Home Telephone Company.

E. G. LISLE has been appointed district manager for the Central Union Telephone Company at Streator, Ill.

W. E. SHOWEN has been appointed manager for the Mutual Telephone Company at Waterloo, Ia.

M. D. STALLMAN has been appointed manager of the Phoenixville, Pa., office of the United Telephone and Telegraph Company.

C. J. WEBB has been appointed manager for the Piedmont and Keyser Telephone Company at Piedmont, W. Va.

H. P. YEAGER has been appointed traffic manager for the Home Telephone Company at Toledo, O.

New Construction in the Field

SAVANNAH, GA.—The Georgia Telegraph & Telephone Company contemplates building long distance lines to operate in connection with its plant at Savannah.

BELVIDERE, ILL.—The Belvidere Telephone Company is to build a line from Belvidere to Rockford, and will also entirely reconstruct its present lines.

GALESBURG, ILL.—The Union Telephone Company is planning to expend $50,000 in building copper metallic circuits which will give connections to Rock Island, Davenport, Burlington, Quincy, Springfield, Aurora, Peoria and other cities.

KEWANEE, ILL.—The Kewanee Home Telephone Company is to build a line from Kewanee to Elmira, where connection will be made with the Stark County Telephone Company.

NUNDA, ILL.—The Union Light & Telephone Company will make a number of new extensions to its system. Additional farmers lines are to be built which will cover the major portion of the country around Nunda.

RUSHVILLE, IND.—The Rushville Co-operative Telephone Company contemplates many improvements in its system.

CHANUTE, KAN.—The Wareham & Wood Telephone Company will entirely reconstruct its system in this town. All of the poles and open wires will be removed and placed in the alleys and the entire system will be constructed of cable instead of open wire as it now is. The switchboard will be the latest multiple common battery type. Work will commence at once, and will be completed within the next four months.

AUSTIN, MINN.—The Interstate Telephone & Telegraph Company is making extensive improvements to its rural system in this vicinity.

LEBANON, N. J.—The Lebanon Telephone Company will soon extend its lines to German Valley.

SOUTHPORT, N. C.—The Wilmington & Southport Telephone Company will extend and improve its telephone system here. W. B. Cooper is president; Richard Doscher, vice-president; Dr. W. I. Watson, secretary and treasurer.

LOWELL, OHIO.—The Lowell Farmers' Telephone Company will establish a local exchange to connect the farmers' lines in this vicinity.

HARRISBURG, PA.—The United Telephone & Telegraph Company is building a new warehouse, which is to be three stories high, of brick, and measure 56 x 75 feet.

AUSTIN, TEX.—The Texas Telephone & Telegraph Company, principal office at Austin, will make important extensions and improvements before the close of the present year. This company is now extending its toll lines to Brady and Georgetown. It recently completed the construction of extensions to Castell and other places. Its lines now aggregate 700 miles. C. C. Gibbs, of San Antonio, is president; W. R. Hamby, of Austin, vice-president, and A. G. Miller, of Llano, superintendent.

FORT WORTH, TEX.—The Fort Worth Telephone Company will build a new line from this point to Dallas.

HANDLEY, TEX.—The Combination Telephone Company will construct a system between Dallas and Fort Worth. An exchange will be established here.

SAN ANGELO, TEX.—The Miles Telephone Exchange has been sold to J. Evan, of Santa Anna. The plant, under his charge, will be improved and enlarged.

SHERMAN, TEX.—The Grayson County Telephone Company, which has its headquarters at Sherman, will extend its long distance lines to a number of towns, among them being Howe, Van Alstyne and McKinney.

OGDEN, UTAH.—The Utah Independent Telephone Company has completed connection to Oaks and is building new lines to Huntsville and Logan.

CHARLESTOWN, W. VA.—The Jefferson County Telephone Company is building new lines in all directions from this point. An exchange is being installed at Harper's Ferry and connections are being established to Shepherdsville and other toll points.

CAMP DOUGLAS, WIS.—The telephone system at the Wisconsin Military Reservation, Camp Douglas, is to be entirely rebuilt in the Fall. C. L. Terry, of Tomah, has charge of the plant.

LA CROSSE, WIS.—The Tri-State Telephone Company is building new lines from this point to Albert Lea.

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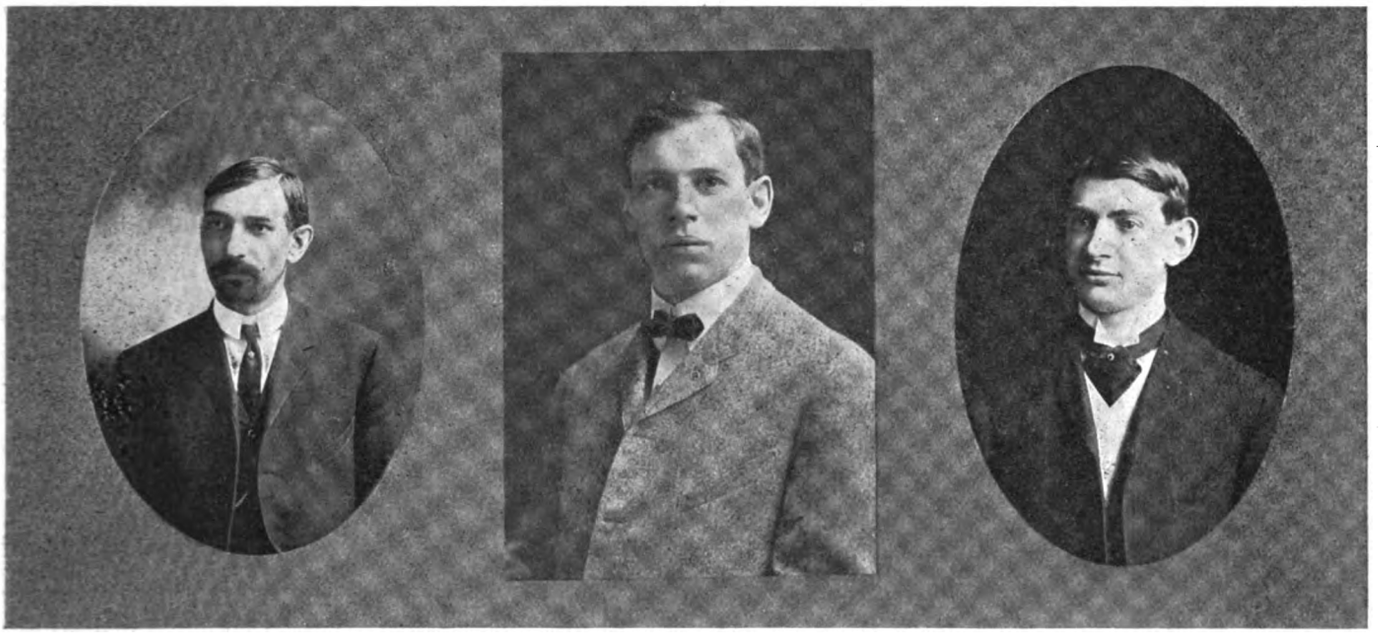
Monarch Electric and Wire Company

BEGINNING in a small way five years ago with about 4,000 square feet of floor space, the Monarch Electric and Wire Company, 125-127 South Clinton street, Chicago, to-day occupies a large and commodious building covering 30,000 square feet and, owing to the constantly increasing business, is obliged to rent warehouse space on the outside. The principle upon which the large business of this house has been built is prompt and correct shipment of orders from one of the largest and most complete stocks of electrical goods in the country and giving the purchaser what he orders. Under no circumstances is a single article allowed to be substituted.

The founder of the business, Mr. S. Mankowitz, began in a small way about ten years ago. He soon saw that there was room for a first-class manufacturer of W. P. wire and galvanized strand and an electrical supply house. From this small beginning has grown the Monarch Electric and Wire Company, which was organized about four years ago and is to-day known throughout the civilized world by its famous product, the celebrated brand of Monarch wires and Monarch strand.



S. Mankowitz. *Louis Schwab.* *Henry Schwab.*

The receiving and city sales departments occupy a large part of the main floor of the large four story and basement building and by a system inaugurated by them have established a reputation for exceptionally prompt service.

The general offices occupy about 3,000 square feet of space on the main floor and are divided into departments. Special provision has been made for the comfort of out-of-town customers.

The remainder of the building is devoted to the large stocks carried by the company and to the manufacturing department.

The factory of the company where the celebrated Monarch brand wires are made occupies three large floors. On the fourth floor is the braiding department, where hundreds of machines braid thousands of feet of wire daily. Hardly an employe is to be seen, as the machinery is automatic in its operation.

This department is in charge of Mr. A. D. Lindsay, who served an apprenticeship with the Chicago Insulated Wire Company, of Sycamore, Ill., where Mr. Lindsay was born. To him no little credit is due for the efficiency of this department.

The third floor is devoted to finishing, compounding, polishing and packing the wire. Here again the observer finds interest in the way the different processes are handled. Automatic machinery is used on this floor and here also are special stranding machines for the manufacture of wire strand, guy wire and cable rope.

This department is in charge of Mr. Abram, who, coming from Cleveland, associated himself with the Monarch people.

The second floor is used as a stock room, where the finished products of the factory remain until shipped to all parts of the world. Here also is an automatic measuring machine, a marvel of ingenuity and simplicity. This department is in charge of Mr. F. Casey.

The department that interests a customer possibly more than any other is the shipping department. This has two divisions, city and country.

Mr. Wm. Mueller, who has long been connected with the company and whose efficient knowledge of the electrical business fits him for the position, has charge of the country department and with a corps of several assistants takes care of all country business.

Mr. George Lewis, with several assistants, has charge of the city business and pick-up department and handles the business to the great satisfaction of their customers.

The city sales branch of the business is in charge of Mr. E. J. Cassin. Mr. Cassin has a thorough knowledge of the sales end of the business, especially fitting him for the position, and has won a host of friends.

"We want young men," seems to be the great cry in every line of business and the Monarch Company seems to be well supplied with the right kind. Among them none has a better knowledge of the duties of his position than Mr. E. Kearns. Though a young man, he has shown by strict attention to business that chances of progress are still here. The company is proud of the young men employed, all of whom are working together to make the company one of the most successful in the business. Mr. Kearns takes care of the trade in Illinois, where his popularity is constantly growing.

Mr. A. D. Gillespie, the Indiana representative, is another of

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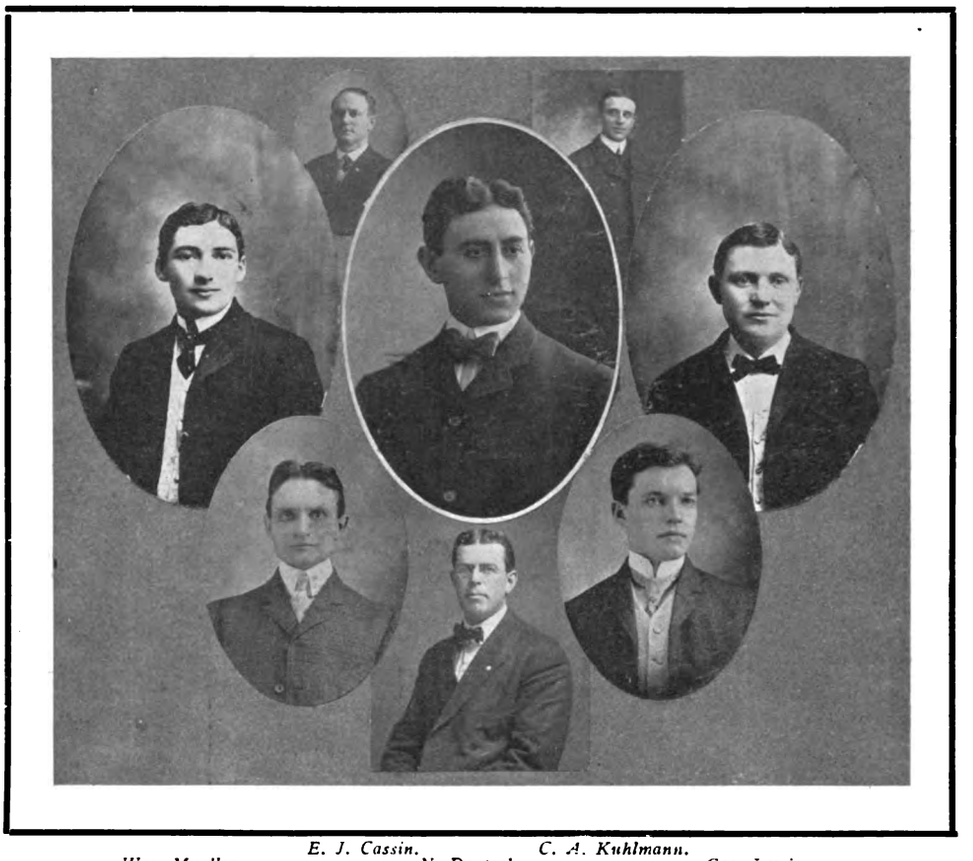
the young men who has in him all the attributes of a successful salesman. This is evidenced by the success he has had in his territory, where everyone knows and likes him.

Mr. C. A. Kuhlmann covers Michigan and Wisconsin and his continued hard work has proven that keeping everlastingly at it brings success.

Mr. L. E. Wolfe is a recent addition to the Monarch staff, having had long experience in the electrical trade and being conversant with all the details. He has jurisdiction over the territory of Minnesota and the Dakotas.

Mr. S. Mankowitz, the president, began life a poor boy, and by hard work and honesty of purpose has achieved high prominence in the electrical field, being very well known by all the large houses in the country. He has entire charge of the factory.

Mr. Louis Schwab, the vice-president, is a Chicago product and, true to the Chicago spirit, has the Chicago push. Mr. Schwab began his career about ten years ago. His great industry and executive ability were soon recognized and he became director and vice-president of a large smelting company, which positions he still holds. Four years ago, with others, he associated himself with the Monarch Company and became vice-president and general manager.



E. J. Cassin. *C. A. Kuhlmann.*
Wm. Mueller. *N. Deutsch.* *Geo. Lewis.*
H. Dishong. *E. W. Kearns.*
A. D. Gillespie.

Mr. N. Deutsch, the treasurer, originally from Cleveland, is now a prominent citizen of Chicago. He is president of a large smelting company and has exceptional ability and knowledge along the lines of finance.

Mr. Henry Schwab, the secretary, is also a Chicago product and to him not too much credit can be given for the efficiency of the company's supply department. He has entire charge of this department, in addition to being credit man.

Mr. W. H. Dishong has charge of the office details and accounts and has proven himself capable and efficient in this department.

The company does a large export business to Australia, South Africa, Hawaiian Islands, Japan and South America.

The growth of such a business as this furnishes one of the best possible proofs of the extent to which electrical apparatus enters into the requirements of daily life, in not only this but, as previously stated, in foreign countries as well.

The Monarch Electric and Wire Company is prepared to meet trade conditions to the utmost and has furnished itself with the means to win success. The establishment it has founded has grown to such proportions that even now it barely represents sufficient room for the conduction of its rapidly growing business. The extreme variety of electrical appliances demanded for practical works calls for a possession of a large stock of merchandise. This is obviously necessitated by the sudden calls made, due to the rapidity with which new installations are planned and completed.

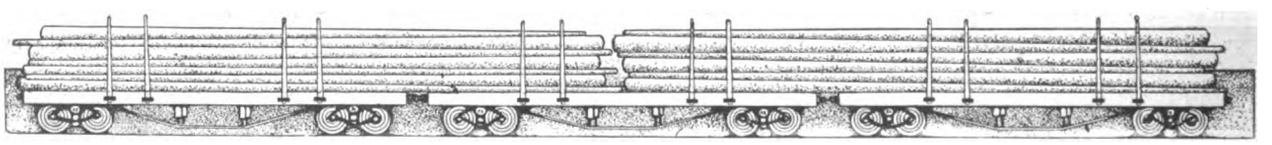
This concern manufactures an extensive line of specialties, besides being in close touch with the largest manufacturers and wholesalers in this country. It is through its proven ability to rapidly fill large and important orders that it has been able to secure so promising a standing with the purchasing public.

The receipt of news from various United States consuls has indicated unusual activity in foreign countries in the way of telephone, electric light, street railway and power construction. In fact, it seems as though such institutions as this have a great influence in the upbuilding of hitherto unsettled districts, forming part of the Australian, South African and South American settlements.

The clerical and executive management of this business is conducted along such lines that the receipt of orders meets with immediate attention, shipping and delivery. Cases frequently arise in connection with construction work where any delay in receipt of goods means a serious loss. In this respect contractors find every advantage in transacting their affairs under such harmonious conditions.

The most important points to be considered in the construction of a telephone system is the quality of wire and its insulation. One of the greatest difficulties met with in exchange operation is the failure of the insulation qualities of the wire employed. This concern has carefully considered such contingencies and has, through a series of exhaustive experiments conducted along the latest and most scientific lines inaugurated a standard of insulation which meets the most exacting requirements of modern practice.

In conclusion it may be stated that the energy of the individual members of the establishment is an index to greater future success in the composite field of commercial and manufacturing activity. If the past record can be used as a basis of comparison, there is every indication that the coming year's business will far exceed in volume that of any previous one.



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CENTURY
100% GOOD

TO EXCHANGE MANAGERS

Two years ago we placed the PLATINUM ELECTRODE transmitter on the market. This transmitter was originated and developed by us. Every exchange manager who has made a careful test of this transmitter has found it far superior to any carbon electrode transmitter.

PLATINUM has valuable qualities possessed by no other substance that makes it an ideal material for electrodes. A few of the good qualities of PLATINUM are:

PLATINUM is unaffected by the electric arc and will not disintegrate, which carbon will do.

PLATINUM offers an exceedingly low surface resistance, making it possible to put all of the resistance into the granular carbon, where it is actually required.

The PLATINUM ELECTRODE makes perfect articulation possible.

The TRANSMISSION of the platinum electrode transmitter is perfect over long and short lines.

The platinum electrode transmitter will not fry or pack, even when submitted to excessive current. This transmitter is made for common and local battery service.

CENTURY TELEPHONE CONSTRUCTION CO.
536 ELLICOTT SQUARE
BUFFALO, N.Y.

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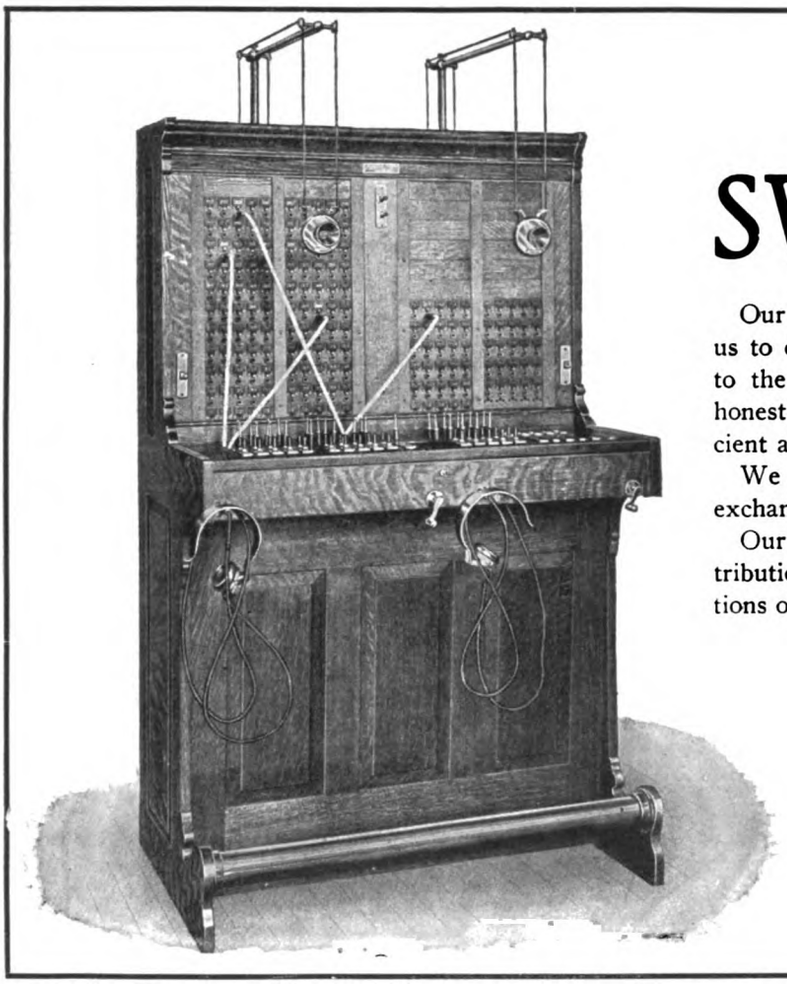

MONARCH SWITCHBOARDS

Our study of small exchange requirements has helped us to design magneto boards exceptionally well adapted to the service desired. Our well known methods of honest and careful construction make these boards efficient and substantial.

We are in a position to quote upon and build magneto exchanges of any size and solicit your inquiries.

Our new switchboard catalog is now ready for distribution and will be mailed upon request. The descriptions of MONARCH BOARDS will interest you.

MONARCH TELEPHONE MFG. COMPANY

10-16 So. Clinton St. Chicago, Ills

$4.60 AUTOMATIC vs. $9.40 MANUAL

Our automatic telephone system has been adopted in the following cities:

Chicago, Ill.	Portland, Ore.
Grand Rapids, Mich.	Woodstock, N. B.
Columbus, Ohio.	St. Mary's, Ohio.
Dayton, Ohio.	Westerly, R. I.
Lincoln, Neb.	Manchester, Ia.
Portland, Me.	Princeton, N. J.
Auburn, N. Y.	Albuquerque, N. M.
Lewiston, Me.	Van Wert, Ohio.
Auburn, Me.	Battle Creek, Mich.
Fall River, Mass.	Clayton, Mo.
New Bedford, Mass.	Pentwater, Mich.
Los Angeles, Cal.	Toronto Junction, Can.
San Diego, Cal.	Wilmington, Del.
Hopkinsville, Ky.	Riverside, Cal.
Sioux City, Ia.	Traverse City, Mich.
Cleburne, Tex.	Hastings, Neb.
Columbus, Ga.	Wausau, Wis.
South Bend, Ind.	El Paso, Tex.
Aberdeen, S. D.	Havana, Cuba.
Miamisburg, Ohio.	Marianao, Cuba.
Medford, Wis.	Berlin, Germany.

Operation and Maintenance Expense per 'phone per annum of one of the Telephone Companies that replaced their Manual with our Automatic System. (We will send name of company and detailed statement of above upon request.)

This saving of more than 50 per cent. in Operation and Maintenance cost is pretty strong evidence of the economy of Automatics.

Hand in hand with the decrease in operating expenses goes the increase in quality of service. This latter means more business. All these Automatic advantages combined mean higher values for securities, bigger dividends for the stockholders.

Don't you see that you're wasting money on that out-of-date Manual equipment of yours? If you're a new company, start with Automatic, and start right.

AUTOMATIC ELECTRIC COMPANY

Van Buren and Morgan Sts. CHICAGO, ILL.

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DEAN TELEPHONE APPARATUS

Compact Telephones

OUR transmitter is now conceded to be the standard of excellence not only in point of transmission, but in careful design and construction. There are, however, other details of great importance in the make-up of a telephone.

We know these requirements and have fulfilled them.

Our compact type telephones have everything that is good in telephone construction. We have slighted nothing.

Let us tell you about these telephones and quote you prices.

THE DEAN ELECTRIC COMPANY
ELYRIA · OHIO

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To WRITE TO ANDRAE Day

ANDRAE Telephone Condensers

IMPROVE SERVICE. MADE IN SEVERAL STYLES

Andrae Condensers are being successfully used wherever installed. They not only allow perfect transmission of signals but improve the talking service.

The accompanying cut illustrates our new form of Condensers, fitted in a handsome quarter-sawed oak case, which is especially adapted for use in connection with telephones already in operation. Anyone can successfully install Andrae Telephone Condensers.

We will furnish any Telephone Company with as many Condensers as are necessary to equip an entire line. If not perfectly satisfactory and entirely as represented they may be returned to us. Write to-day for illustrated printing matter.

JULIUS ANDRAE and SONS COMPANY

99 WEST WATER STREET - - MILWAUKEE, WISCONSIN

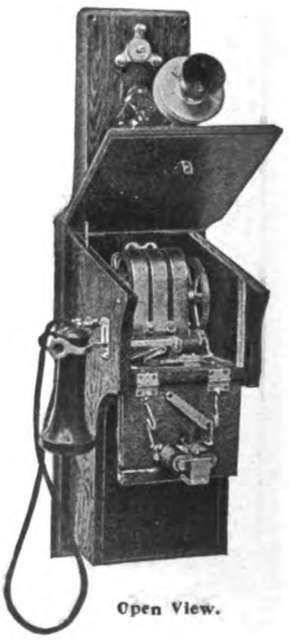
GET IN LINE ON UP TO DATE APPARATUS

If you order Central "Leader Junior" Telephones you will be buying now what you are sure to buy ten years from to-day.

Closed View.

CENTRAL FUSE BLOCK

LIGHTNING ARRESTERS



Open View.

Sample Series—4 Bar or 5 Bar Bridging Leader Junior Telephone shipped to any responsible party in the United States on 30 days' trial prepaid freight.

Sample Fuse Block as above sent free on request to any one mentioning this ad.

CENTRAL TELEPHONE & ELECTRIC CO.

2135 Lucas Ave., St. Louis, U. S. A.

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Blakeslee Forging Co..... —
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Okonite Co..... 37

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Roth Bros. & Co..... —
Runzel Lenz Elec. Mfg. Co..... —

Sand Point Cedar Co..... 36
Schaper Construction Material Co. 33
Simplex Electric Co..... 1
Standard Underground Cable Co.. 14
Stanton, L. W..... 1
Sterling Electric Co..... 11
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Sumter Tel. Mfg. Co..... 34

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Ready Pole Seats

Strongest Pole Seat Made.

All Iron, adjustable to any Pole.

Ready Reels, Tools, &c. Cable and Telephone Supplies

The W. G. Nagel Electric Co.

Toledo, Ohio.

Type SW Terminal. No pothead necessary. Equipped with carbons and tubular fuses.

COOK'S
POLE CABLE TERMINALS AND JUNCTION BOXES
FOR
Multiple Tap Cable Distribution

Cook's Terminals furnish the most approved forms of protection, and the best and simplest means of cable distribution.

Cook's Junction boxes are best for cable splicing. They can be used in conjunction with the terminals or alone. At points where you desire to dead-end your cable use Cook's Junction Box. You can add a cable Terminal later if you wish.

SELF SOLDERING NOZZLES
Are Furnished With Both Terminals and Boxes

WRITE FOR PLAN FOR YOUR CABLE LAY-OUT

Frank B. Cook

238 WEST LAKE ST., CHICAGO, ILL.

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KELLOGG PHILOSOPHY

ARE YOU LOOKING FOR INFORMATION?

DO YOU KNOW THE ADVANTAGES OF THE

4-PARTY HARMONIC SYSTEM?

THE PRINCIPLE OF WHAT IS KNOWN AS THE HARMONIC SYSTEM OF SELECTIVE RINGING IS VERY SIMPLE. ADVANTAGE IS TAKEN OF THE FACT THAT EVERY REED HAS A NATURAL PERIOD, OR RATE OF VIBRATION AND CAN BE MADE TO TAKE UP THIS VIBRATION BY APPLYING TO IT A SUCCESSION OF COMPARATIVELY SMALL IMPULSES OF FORCE OCCURING IN THE SAME PERIOD AS THAT OF THE REED. THE SAME AMOUNT OF ENERGY APPLIED AT A RATE DIFFERING MATERIALLY FROM THE PERIOD OF THE REED WILL NOT CAUSE IT TO TAKE UP ITS FULL SWING. IT ONLY REMAINED FOR THE KELLOGG COMPANY TO DESIGN A RINGER HAVING A REED OR ARMATURE WHICH WOULD BE ACTED UPON BY ELECTROMAGNETIC IMPULSES DUE TO RINGING CURRENT PASSING THROUGH THE RINGER COILS AND THEREBY MADE TO TAKE UP ITS FULL SWING WHEN THE IMPULSES WERE OF A FREQUENCY CORRESPONDING TO THE NATURAL PERIOD OR RATE OF VIBRATION OF THE ARMATURE. FOUR DIFFERENT REEDS WERE DESIGNED AND GIVEN DIFFERENT RATES OF VIBRATION BY PUTTING AT THEIR ENDS METAL BALLS OF DIFFERENT SIZES WHICH WERE TO SERVE AS TAPPERS ALSO, STRIKING THE GONG DIRECT. A RINGING MACHINE IS PROVIDED GIVING RINGING CURRENT OF FOUR DIFFERENT FREQUENCIES; ALSO A SUITABLE RINGING KEY FOR THROWING ANY ONE OF THE FOUR FREQUENCIES OUT ON THE LINE. THE FOUR INSTRUMENTS ARE BRIDGED ACROSS THE LINE EACH WITH A CONDENSER IN SERIES. THEN WHEN CURRENT OF A GIVEN FREQUENCY IS IMPRESSED ON THE LINE, THE ARMATURE HAVING THE PROPER PERIOD OF VIBRATION,—TAKES UP ITS SWING, STRIKING ITS TAPPER AGAINST THE GONG WHILE REEDS AT THE OTHER 3 STATIONS WILL NOT BE AFFECTED

KELLOGG SWITCHBOARD & SUPPLY CO.

CONGRESS AND GREEN STREETS, CHICAGO, ILL.

BRANCH OFFICES

PHILADELPHIA, PA.	CLEVELAND, OHIO	NEW YORK CITY	LOS ANGELES, CAL.
KEYSTONE BUILDING	ELECTRIC BUILDING	116 NASSAU ST.	SEYMORE BUILDING

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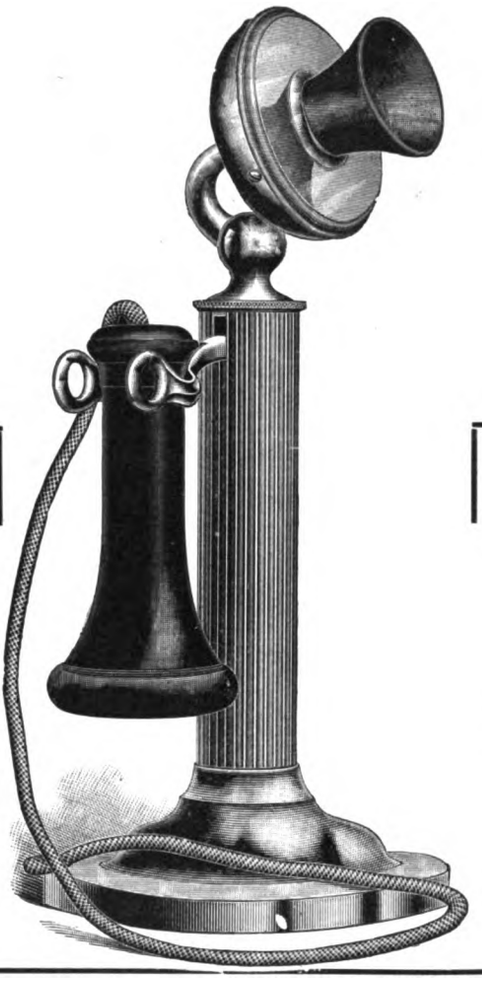
No. 19

DESK STAND

All contacts enclosed
Hook self-contained
Heavily nickel plated
Will not wear off



STERLING ELECTRIC CO.

La Fayette, Ind.

DOUBLEDAY-HILL ELECTRIC CO.

PITTSBURG, PA.

MANUFACTURERS AND DEALERS

ELECTRICAL SUPPLIES

SPECIAL

High Grade "B B" Iron Wire No. 10.
" " " " " No. 12.

IF YOU HAVE USE FOR THIS WIRE, WRITE US AT ONCE.

For a short time we will make Special Prices on

Standard Cross Arms 3¼ x 4½, any length.
" 1½ x 9 Locust Pins.
" 1¼ x 8 " "
" Oak Brackets.

GET QUOTATIONS AT ONCE.

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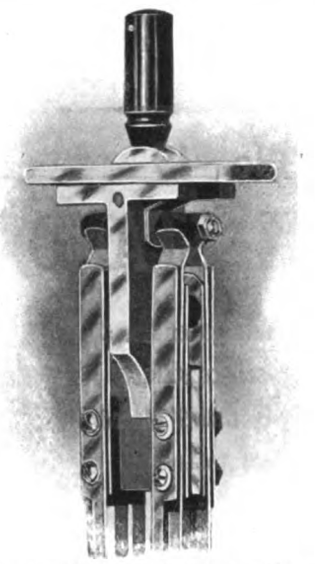
STROMBERG-CARLSON

KEYS

Of course, the successful operation of a board does not depend entirely upon the keys with which it is equipped; nevertheless, we make ours of as good material and test them as carefully as if this were true.

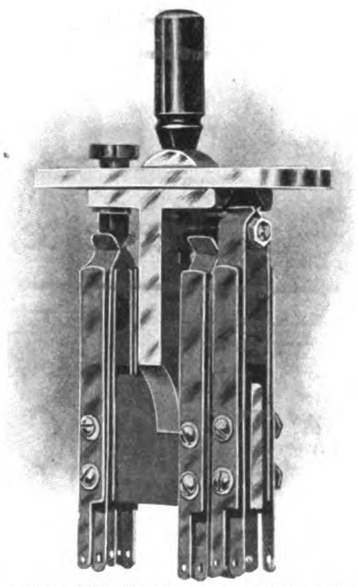


No. 16—Ringing and Listening Key.

Pure Platinum Contacts

Pure German Silver Springs

Our determination to make the best switchboards, and with the facilities that we have for doing so, has made them standard for *quality*. All our keys are provided with PURE PLATINUM CONTACTS AND PURE GERMAN SILVER SPRINGS.



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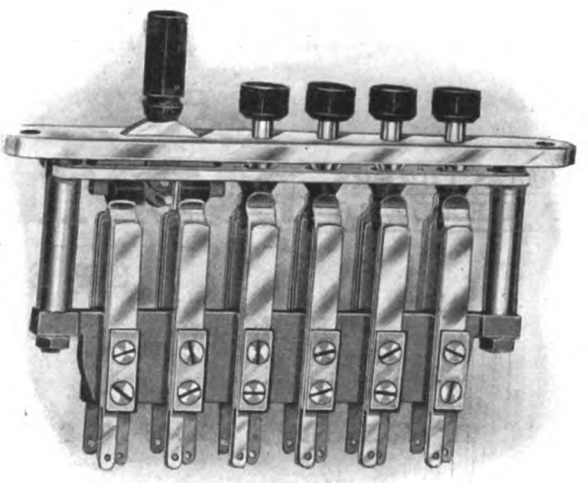
Our four-party selective indicating key, shown here, has been thoroughly tested by many of the leading Independent telephone companies.

This key only introduces two contacts in the talking circuit—a good point.

We are always glad to mail bulletins or circulars free.



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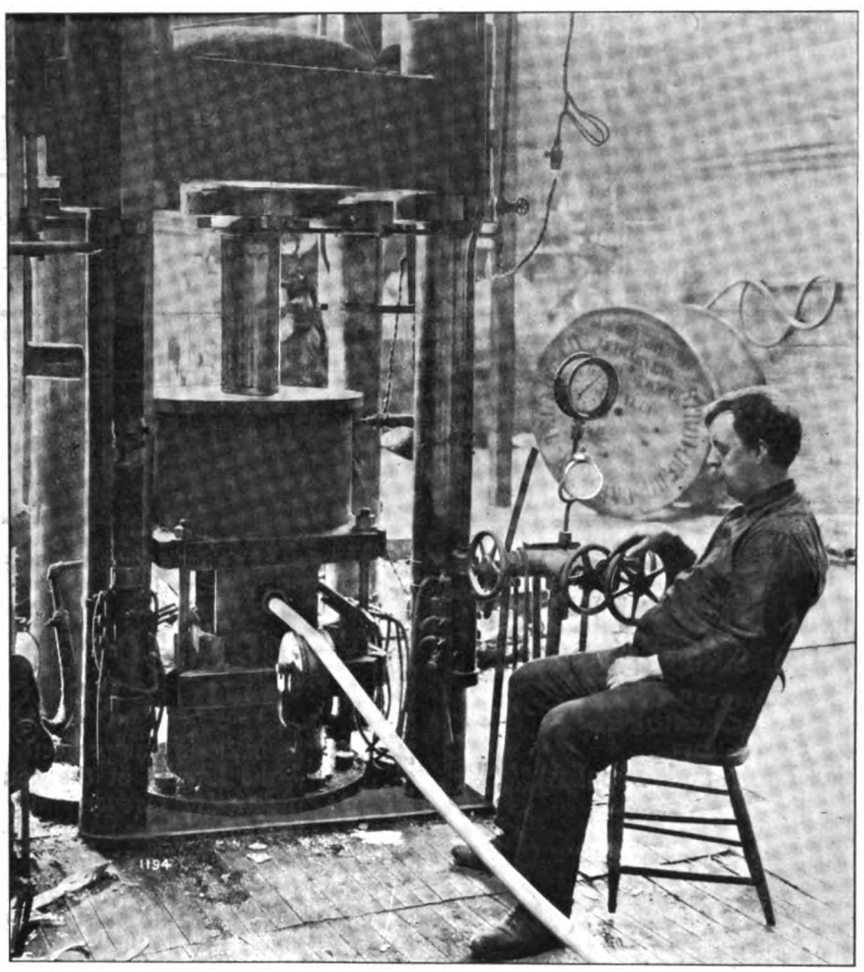

The above is a photographic illustration of one of our four presses as they appear in operation.

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A mirror placed below the pipe is used to facilitate inspection of the bottom of the pipe.

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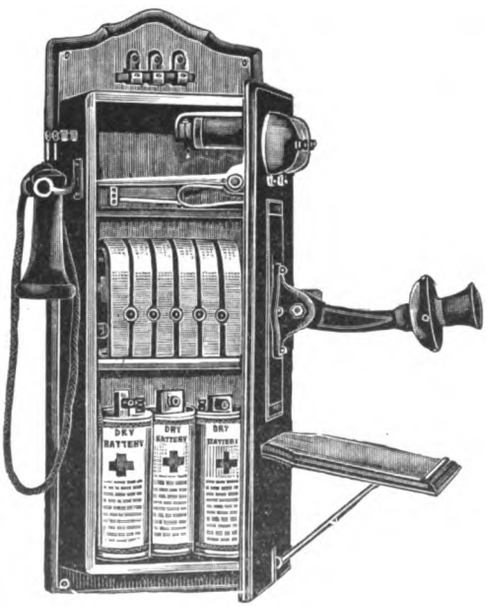

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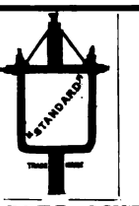
Telephone Wire  **and Cables**

BARE COPPER LINE WIRE
Weatherproof and Rubber Insulated Wire and Cables
Aerial—Underground—Submarine Lead Covered Cables
TERMINALS—STEEL STRAND—HANGERS

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VOLUME XII *SATURDAY, AUGUST 19, 1905.* *NUMBER 8*

The Phenomena of Lightning—Article I

By Newton Harrison.

WITH the development of telephony the increase in overhead wires became a serious problem on account of the dangers of lightning. A great network of conductors naturally presents a means whereby electrostatic charges may become focussed. The result of this concentration of electrical energy bursting its bounds is too well known in a general way to deserve more than passing comment. In the illustration cases are shown of discharges taking place between a high point on the earth and a charged cloud, as shown in the Eiffel Tower photograph (Fig. 1), or between the earth and a cloud, as shown in Fig. 2. Another interesting case of a lightning discharge is shown in Fig. 3. In this instance the discharge is taking place between two clouds and the earth respectively. From a scientific standpoint knowledge relating to such manifestations is in the possession of few. A brief review of some of the conditions giving rise to danger spots in a telephone system and an indication of the means necessary to secure protection may prove of interest.

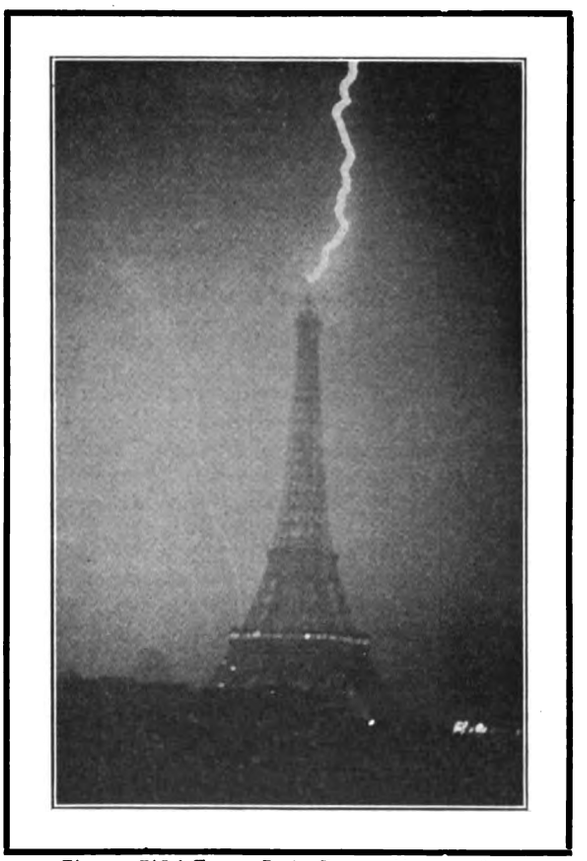

Fig. 1. Eiffel Tower, Paris, France, May 31, 1897. From collection of W. J. Jenks, 120 Broadway, New York.

Certain simple principles in the study of electricity must be presented to properly interpret lightning discharges and their eccentricities. What is called static electricity differs from dynamic in the sense that one is electricity at rest, the other electricity in motion. A static charge is therefore a quantity of electricity stored up for a time, such as the charge accumulating in clouds or in the earth at certain places. Electrostatic induction is due to the influence of a charge upon a neutral body, as for instance the conditions presented by a so-called thunder cloud overhead and a system of telephone wires beneath. Induction of this character bears no relation to electro-magnetic induction or inductance, but relates entirely to the development of definite charges in a hitherto unaffected body by the mere presence of a static charge. In other words, the cloud masses and the earth are merely instances of the play and by-play of positive and negative electricity during thunderstorms; cases where static induction gives rise to accumulations of electricity at a high potential which discharge either between cloud and cloud or between the clouds and the earth.

Although electricity at rest is called static, yet it is readily perceived that its movement would naturally place it in the other category. When moving, during the moment of discharge, it possesses all the qualities of a high tension, low amperage, oscillating current. By this is meant that the disruptive discharge occurring between a cloud and a system of telephone wires, appearing as a single jagged flash of lightning, is in reality composed of millions of individual discharges which move back and forth with inconceivable velocity and diminishing intensity. The situation is readily defined as an instance of where a static charge of positive electricity in a cloud mass overhead affects all the neighboring area beneath it by electrostatic induction. Negative electricity is thus accumulated in the earth, and its points of highest tension are those nearest to the cloud, the elevated telephone wires for example. As the positive electricity in the cloud mass rises to a higher tension, due in all probability to a concentration of the vapor and a greater nearness to the earth of parts, a corresponding rise of potential takes place in the telephone wires beneath. It is impossible to claim that the lightning leaves either the cloud or the system of wires first. An electrostatic discharge always leaps from a point of higher to one of lower potential, or it causes neutralization of equal quantities of positive and negative electricity practically instantaneously. Optical delusions therefore are not to be relied upon in deciding such questions, as the eye is absolutely incapable of receiving the true picture of anything but the resultant composite effect.

Further examination of the lightning discharge shows that its rate of oscillation is dependent upon the relative capacities of the bodies from which it leaps, the distance it covers and the amount of resistance in such conductors as it partially or wholly traverses. Lightning protection for telephone circuits can only be successfully accomplished when the devices employed for such service are designed with reference to this important point, namely: the varying rate of oscillation of disruptive static discharges.

The simile of a tub of water suddenly tilted will give an impression of the effect produced by disturbing the charge of a condenser. The water oscillates back and forth with diminishing velocity. Each wave succeeds another until rest prevails. With a smaller tub the waves are initially more rapid. A very small

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vessel containing water would develop the highest rate of motion under these circumstances. Similarly a circuit containing more or less resistances will be the means of permitting a static discharge to send current waves back and forth with a velocity governed by this condition.

A conductor affected by waves of electricity, though static impulses, will develop self-induction. It will be surrounded by lines

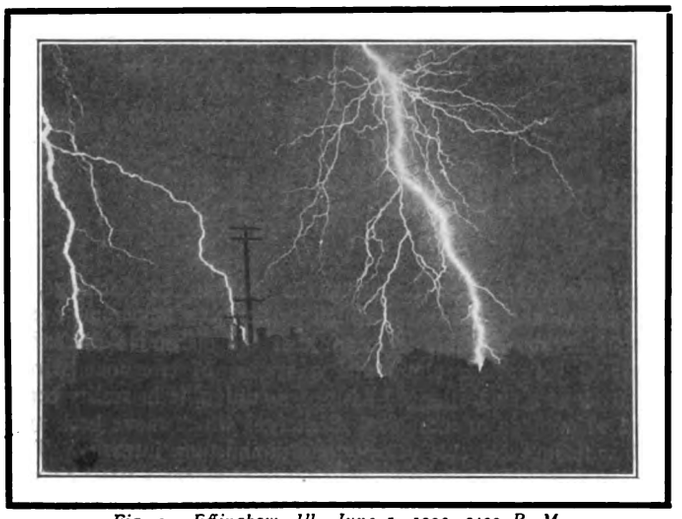


Fig. 2. Effingham, Ill., June 5, 1903, 9:30 P. M.
From collection of W. J. Jenks, 120 Broadway, New York.

of force intermittently and in consequence give rise to a back electro-motive force proportional to the rate of oscillation of the electric surgings. The more rapidly the electricity oscillates the greater the inductance developed, and in consequence the less permeable becomes the conductor. In fact a condition is soon reached where, if the rate of oscillation of the static discharge reaches a certain high point the conductor, though of an exceeding low resistance, cannot be penetrated by the electricity. In fact, it becomes, both practically and theoretically, a non-conductor. From this basis of reasoning it is self-evident that a wire of low resistance may not be preferable to a non-inductive circuit of high resistance.

The protection of a telephone circuit can be carried out by providing two things: First, a means of dissipating lightning in the commonly accepted meaning of the word, and thus protecting the apparatus from injury; second, a means of permitting a cumu-

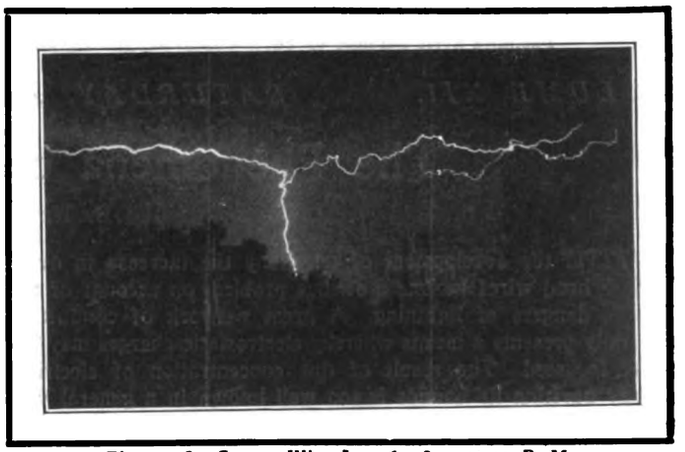


Fig. 3. La Crosse, Wis., June 6, 1892, at 11 P. M.
From collection of W. J. Jenks, 120 Broadway, New York.

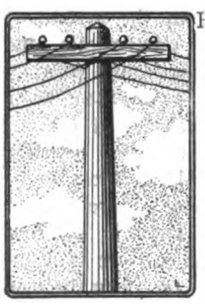
lative charge, developed through electrostatic induction, to be dissipated before a disruptive discharge can take place.

The highly oscillatory nature of the lightning discharge means that it cannot be conducted by a medium developing inductance. If such a charge is given the choice of a few turns of wire and an air gap, it will leap the air gap in preference, simply because that path is non-inductive. The key to the situation is therefore found in providing a non-inductive path for lightning discharges.

(To be continued.)

Telephone Publicity*

By Vinton A. Sears.



THE three main objects of the association as suggested in Mr. Theodore Gary's recent statement seem to hit the nail on the head, and I believe that if these three objects can be thoroughly organized and completely carried out, great benefit will accrue to all the members. "To gather information and statistics of the Independent telephone business" is the first. This object is, perhaps, the most important at this time; it has been neglected in the past, but in the future it can undoubtedly be made one of the greatest helps to the Independent telephone business. If the association is to receive the hearty moral and financial support of the many thousands of companies, it must return them direct benefit of value to their daily business. Almost every one of the companies can be materially benefited by the inauguration and carrying out of a "Telephone Publicity" department.

The telephone story can be told so well and truly that it will carry conviction throughout the land. Its form should be attractive to the disinterested so as to awaken new interests. Every statement and table of statistics should be authenticated beyond the question of a doubt. The actual condition of this business is good enough without overestimating any part of it. Conservatism in this respect might be advantageous. The future holds attractive prospects and the realization of such progress as will certainly be made, will surely command the increasing interest of investors if given the light of publicity from time to time. It must be admitted that the opposition has a fundamental advantage in that it has been able to secure its new capital at a cost of 4½ to 5 per cent. per annum, while many of the large Independent plants have been financed upon a basis that cost 10 to 12 per cent. per annum upon the capital employed, in order to take care of their bonds and pay a dividend upon their stock, which dividend seems to be necessary to prove that the company "makes good," although, perhaps, the stock represents no cash investment. That the average company can make good with such handicaps is the best proof of a healthy and profitable business.

This high cost of capital is a serious matter and, while it is gradually improving from natural causes, yet something should be done to more forcibly prove to bankers and investors that the telephone business is stable and profitable enough to warrant the investment of capital at no more than the ordinary rates of interest (there being a safeguard in excess earnings).

This business is, and can continue to be, highly profitable as compared with other lines, and it can earn a great deal more than the ordinary interest on capital. Surplus earnings should insure, first, the stability of the investment; second, provide for the most efficient management and employes; and, third, leave a reasonable profit for legitimate promotion. In other words, telephone securities should be sold at a reasonable cash price, as compared with other public service corporation securities. That they have not yet become so favorably known in the money centers of the country, is due to the lack of "telephone publicity."

The association might, and in my opinion should, create a well-equipped department for compiling information and statistics in proper form for the use and encouragement of its members. An attractive pamphlet might be issued once in three months, show-

*Abstract of paper submitted at National Interstate Convention, June 20th, 1905.

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ing the highest development in various parts of the country, including some shining examples of success for the encouragement of the weary workers, and a number of comparative tables of growth, progress, dividends, etc., covering all phases of the business.

There would be little, if any, difficulty in securing regular reports from the principal telephone companies, together with other appropriate statements of the business, such as would enable this quarterly report to contain the most absolute evidence and up-to-date proof of the progress and success of this business. One of the strongest cards the Bell has to play is its monthly statement of increased output of telephones. Stockholders, bankers and investors read these reports (for they never fail to appear in all the financial papers) and continue to feel secure in their faith that the Bell system monopolizes the field, unless, perchance, they see actual evidence of competition, and then they are apt to think it exists only in their locality.

Statements and statistics should be so made as to compel belief among the incredulous, not simply the approval of the Independent telephone man, who knows a lot of things that he can't prove. A quarterly record of facts showing the best of everything would furnish first-class material for the use of all classes of telephone workers. A new company should find in it sufficient evidence to convince any honest city council of the desirability of competition and to show that a community cannot expect the best service at a reasonable cost in any other way.

You have all recognized the necessity for a national telephone publicity department, and you would all probably support it provided it can be created and maintained in a business-like way. It is a simple thing and yet one not without difficulties. But if it had no difficulties it could be carried on by any one and there would be no necessity for the association to take it up, nor credit in making it successful. The Independent telephone business has to-day reached a stage of development that will permit its taking great strides forward in the next few years, and these strides should be actually chronicled.

Telephone Rates on the Continent—Article III

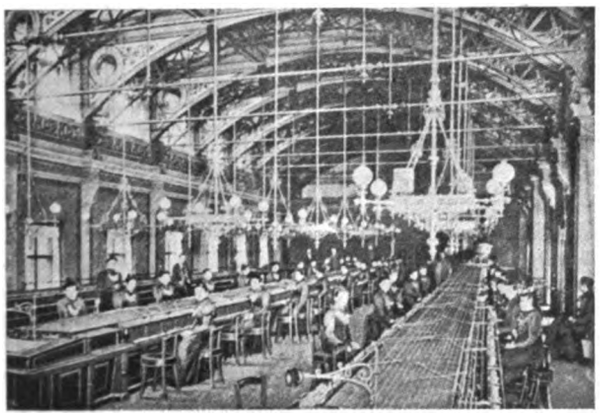
GERMANY

By Dr. Alfred Gradenwitz.

TELEPHONE exchanges will receive messages to be transmitted at a fee of 1 pfg. per word, the minimum fee being 20 pfgs., and the total amount being made up to the nearest multiple of 10. For forwarding communications through the post, by express or by telegraph, the regulation fees are charged in addition. Telegrams may be transmitted to a subscriber by telephone at a charge of 10 pfgs. each.

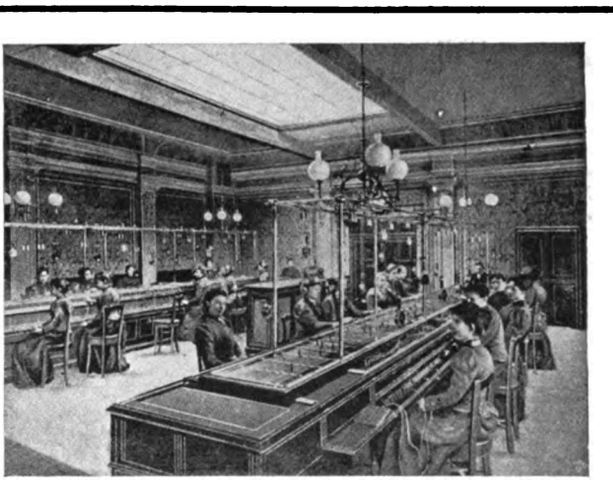
For moving telephone within the same room the administration charges 4 marks for single wire lines and 6 marks for double wire lines. For removal within the same building, 6 and 10 marks, respectively, and for removal from one building to another, 15 and 25 marks, respectively, is charged apart from an additional fee to be charged in case the distance of the new place is upwards of 10 km. from the central exchange. For discontinuing a telephone subscriber station before the expiration of the subscription, 15 marks is charged, in addition to the portion of the expense of construction and the taking down, corresponding to the interval up to the time of expiration of the subscription.

Any subscribers paying the lump subscription are entitled to grant to other persons the gratuitous use of their connection lines for exchanging communications, either with other subscribers or with the public telephone call offices of the same system. They are entitled to charge such persons as make use of their apparatus for any fees they have to pay themselves for the conversations exchanged.



Horizontal Multiple Board in Dresden. 1,200 line capacity.

Telephonic conversations between networks in neighboring communities, are allowed without any additional fee. If, however, any subscriber wants to profit by this authorization, in case the lump fee in the neighboring community be higher than his own, he should pay the higher fee, and the same holds in the case of his paying so much per conversation. Whenever these conditions are not attended to, the fee for one conversation of three minutes at most in the service of neighboring communities is fixed at 20 pfgs. The fee for one conversation of three minutes at most in the suburban traffic is fixed at 20 pfgs. Subscribers paying the lump subscription of 200 marks per year are, however, entitled to make use of any connection lines of the suburban service without any additional fee. As regards the interurban service, the following fees are charged within the boundary of the telegraph service of the Empire as well as with any telephone station of Bavaria and Wurttemberg:



Telephone exchange No. 6, in Berlin. Equipped for 7,200 lines.

Up to 25 km.	Marks 0.20
50	0.25
100	0.50
500	1.00
1000	1.40
exceeding 1000	2.00

Telephonic conversations with foreign countries are subject to special tariffs.

Night Conversation.—The fee for a connection obtained by

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night (i. e., from 9 o'clock p. m. and 7 a. m. in summer or 8 a. m. in the winter) is, within the same telephone system, 20 pfennigs. In telephone systems having no night service, a telephone connection between two given subscribers can be obtained by previous order, for a fee of 1 mark per month. The same system of pre-determined conversations is applicable to telephone connections established every day, at the same hour.

The minimum duration of a night conversation is 6 minutes and the maximum 12 minutes. Such conversations as are subscribed for between two given persons, should be relative only to personal affairs of the subscriber or those employed by him.

Public telephone pay stations.—The fee for a connection obtained by the intermediary of public telephone pay stations, is fixed for a conversation of at most three minutes at 10 pfennigs within the boundary of the town, and 20 pfennigs in suburban service.

If a pay station is rung up, with a view to having somebody living in the neighborhood called for conversation, a fee of 25 pfennigs is charged.

Automatic telephone apparatus.—Any connections obtained through automatic telephone pay stations are subjected to the rules stated in the preceding paragraph. This means that communication is allowed only in connection with pay stations in industrial districts, and interurban lines.

Subscribers' secondary stations.—Any subscriber paying a flat rate is allowed to install in the houses of other persons, or in his own house, secondary (extension) stations, situated at a distance of 16 kilometers at most from the telephone exchange and connected to his main apparatus, up to a maximum number of five secondary telephones. The owners of these secondary telephones are allowed to use them for conversations, both with the main subscriber and any other subscriber included in the telephone system.

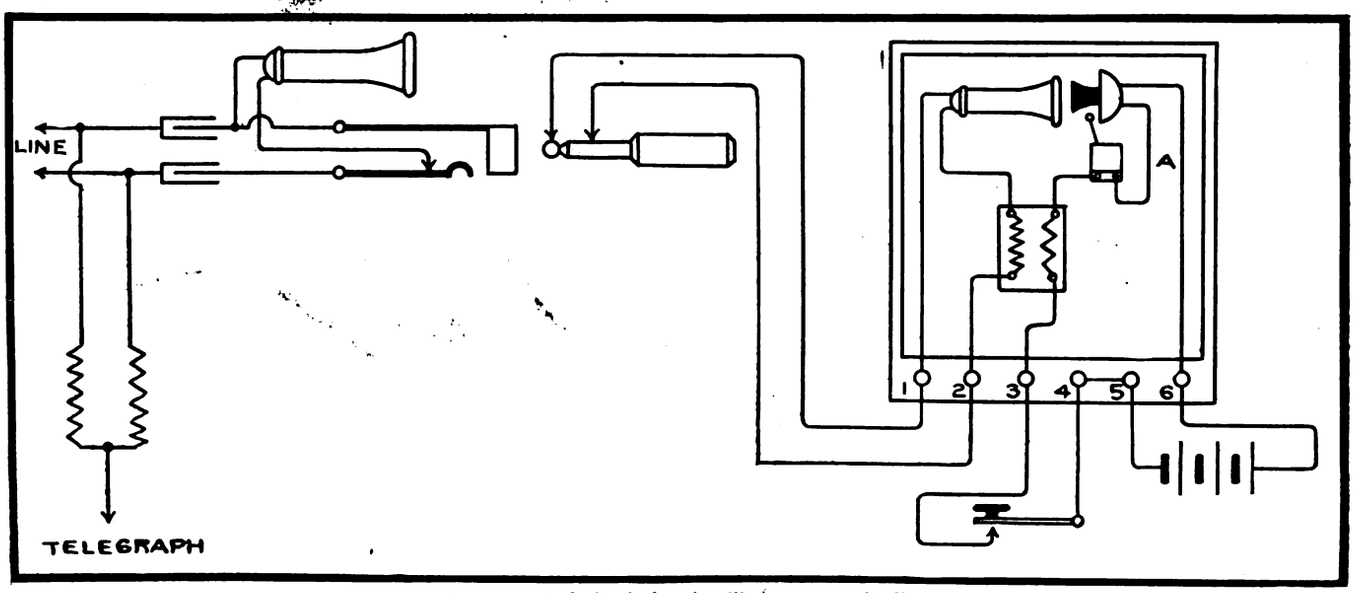
For each secondary telephone installed in the houses situated on the same block as the main subscriber's house, a sum of 20 marks is charged per annum and 30 marks for any other telephone situated outside. If the line used for the connection of the secondary telephone is more than 100 meters in length, the sum of 2.50 or 5.00 marks, respectively, will be charged for each length or fraction of a length of 100 meters, according as the line is ground or metallic.

(*Concluded.*)

A Device for Signalling on a Composite Telegraph Line

By M. D. Hackler.

When a telephone line is provided with composite sets for simultaneous telephony and telegraphy considerable difficulty is often met with in signalling on the telephone line. When current from an ordinary hand or power generator is used it not only actuates the telephone bells or drops, but also the telegraph relay, thus interrupting the telegraphing by causing a fluttering or a rapid making and breaking of the telegraph current. The amount of fluttering will depend on the frequency of the generator. The idea of the arrangement here described is to provide a means of signalling on such a telephone line that will be as reliable as the ordinary method of ringing on the line direct with an alternating current.



Arrangement of circuit for signalling on composite line.

By referring to the diagram it will be noticed that when the receiver of a short-circuited local battery set is placed directly in front of or nearly in contact with a telephone transmitter and started to vibrate a humming or whistling sound is continuously emitted.

The apparatus for producing this sound is best arranged as follows: Take any ordinary bell box or one nearly the same size and remove the generator, ringer, switch hook and all the wiring, leaving only the six binding posts at its bottom. Fasten a receiver and transmitter, as shown in diagram. Bring one side of the transmitter to post 6 and the other side to one post of an ordinary vibrating bell *A*, from which the interrupter has been removed, thus making it a single stroke bell. The other post of the bell is connected to the primary winding of a common local battery induction coil and the other side of the coil to post 3. Posts 4 and 5 are connected together.

The single stroke bell is so arranged that in making a stroke it strikes the transmitter. One side of the receiver is brought to post 1 and the other side through the secondary winding of the induction coil to post 2. Posts 1 and 2 are connected to the tip and sleeve of a plug on the operator's position along with the other plugs. Posts 3 and 4 are connected to a push button for closing the circuit, which may be placed in any convenient position before the switchboard operator. To posts 5 and 6 are connected four or five cells of battery.

The line is brought to the switchboard in the same manner as any other line, except that the drop is replaced with the bipolar receiver. The operator desiring to signal the distant station, inserts the signal plug in the line jack and presses the push button the number of times corresponding to the number rings of the

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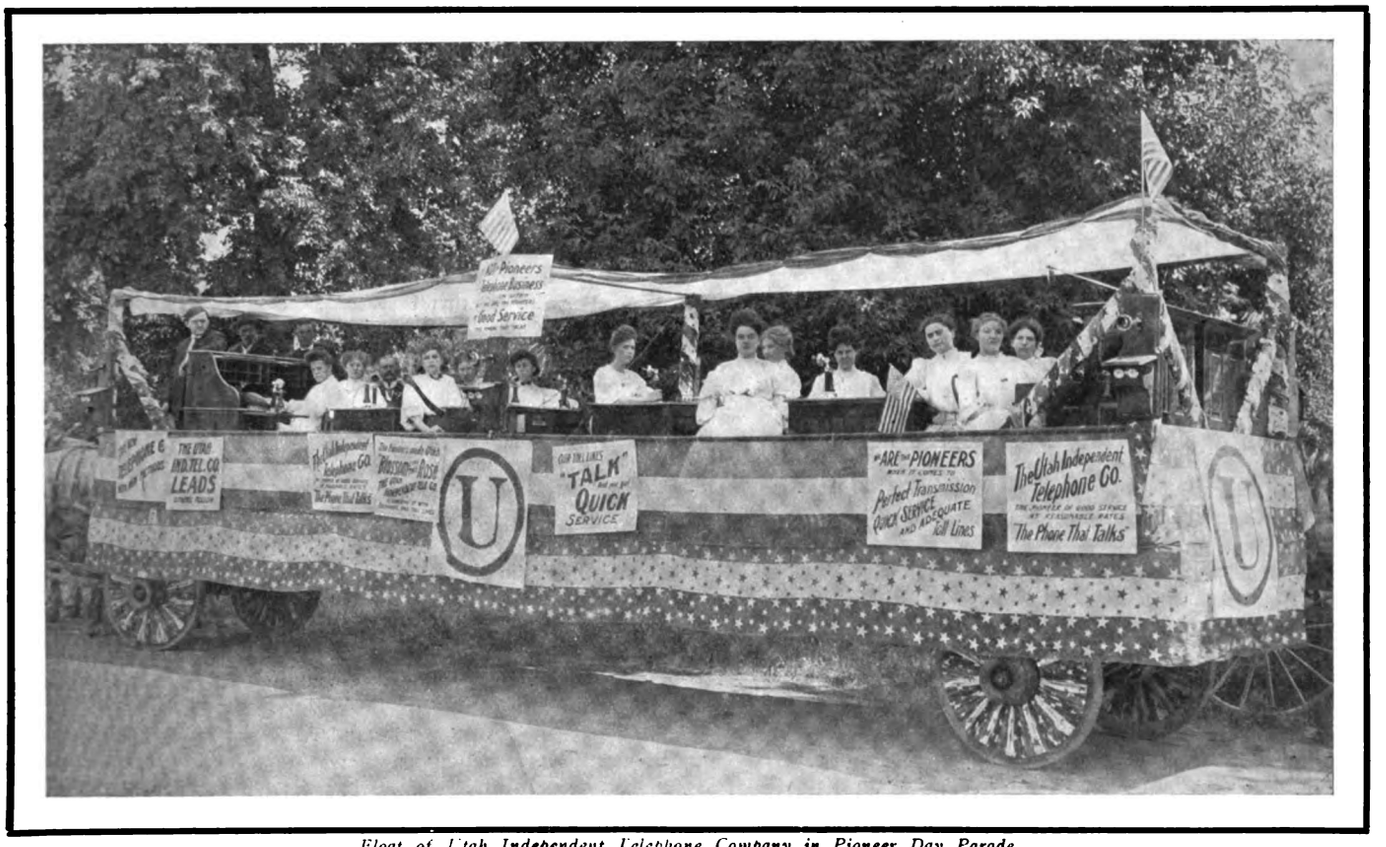
called station. The signal plug is then removed and the operator goes in on the line with her regular talking plug. In using this signal scheme a split retardation coil of as low as 50 ohms resistance can be used in the composite set. This set will also take the place of a howler for calling subscribers who have left their receivers from the hook.

The Utah Independent Telephone Company's Float in the Pioneer Day Parade

By C. O. Harris, Local Manager, Salt Lake City.

UTAH'S great day is July 24 of each year and is known as "Pioneer Day." It commemorates the arrival of that brave, hardy band of pioneers who entered the Valley of the Great Salt Lake July 24, 1847, at Salt Lake City. Each year sees the number growing less, but, with the diminishing numbers, the greater interest is displayed by young and old and more honors are heaped upon that fast expiring band. Great preparations were made this year to properly celebrate the day and the people of Utah responded nobly to the call, almost the entire State being present. In addition to the pioneers themselves, and there were a number of those who crossed the plains in 1847 in the parade, interest was centered in the handsome floats, which served as object lessons to the present generation.



Float of Utah Independent Telephone Company in Pioneer Day Parade.

Conspicuous, not only for its beauty, but for the lesson taught was the magnificent float of the Utah Independent Telephone Company. The idea, as set forth by the committee of arrangements, was to have something indicative of the progress made since 1847 and calculated to contrast sharply with the preceding features of the parade. The position assigned the float was immediately after the pony express and stage coach and, from the first, it was realized that the more up-to-date the float was the greater would be the contrast. It was decided that the modern private branch telephone exchange typefied in the greatest measure the most recent development of the telephone art, and, with this idea in view, the telephone company proceeded to make it a practical reality.

Fortunately it was able to secure a large wagon, 40 feet by 8 feet, used for hauling theatrical scenery. Upon this were mounted two very handsome Stromberg-Carlson central energy, lamp signal private branch exchange switchboards, fully equipped and operated by a set of dry batteries concealed under the float. Office desks were used to give the float an appearance of a commercial establishment, and upon these were placed telephones in addition to a number of instruments fastened to the side of the float, all connected to the boards. Twelve operators, including the chief operator, Miss Ethel A. Back, graced the float with their beauty and charm, adding greatly to the attractiveness of the float, which was tastefully decorated and was drawn by three magnificent Norman horses.

The occasion was ripe for the indulgence of a little "airy persiflage" in the matter of signs, some of which were as follows: "The ox team was *slow,* the pony express was *quick,* the telegraph was *quicker,* but the Utah Independent Telephone Company is the *quickest* thing in Utah." "The pioneers made Utah 'Blossom like the Rose' the Utah Independent Telephone Company is covering it with exchanges and toll lines." "We are the Pioneers when it comes to perfect transmission, quick service, and adequate toll lines." "We have no Pioneer telephone apparatus. Ours is up-to-date, so is our service." Etc. Some of these can be seen in the illustration.

The accompanying illustration shows what a little effort will bring forth when the cause is worthy of it. The float was admired by every one, and received continued applause along the line of the parade.

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Convention of Central Illinois Independent Association

By Willis Evans, Special Correspondent.

THE third quarterly convention of the Central Illinois Independent Telephone Association was held at the Coliseum Building, Peoria, Ill., on Monday and Tuesday, August 7th and 8th.

The meetings were largely attended and much enthusiasm manifested. Amongst others present were James B. Hoge, president, and A. L. Tetu, secretary of the National Interstate Telephone Association; Senator O. F. Berry, president of the Mississippi Valley Telephone Company, and C. W. Buffum, president of the Missouri Independent Telephone Association.

Mr. C. R. Conklin, who was elected president of the new State organization formed at this convention, did effective work on the floor and led in all the discussions.

The first session was called to order by President G. H. Glass, who introduced the Hon. T. N. Gorman, representative of the mayor of the city of Peoria.

Mr. Gorman spoke in part as follows: "I appreciate the proposition of going out and looking for business on the Independent plan. The only way you can get business is to show the people that you have got something which is better than the other fellow has.

"There is only one Independent telephone man that I know and his name is Conklin, and from what he has told me about the Independent telephone, of course, I feel that the other fellow is not in it, and I am one of those fellows that is awfully susceptible to anything that is told me, and I think I believe all that Conklin told me.

"I appreciate the fact that you came here, not to have a good time, but to do business, and I desire you to make your visit to our city an enjoyable one, and I bid you a hearty welcome here and hope that your visit will be a profitable as well as a pleasant one."

President Glass then introduced the Hon. C. B. Cheadle to respond to the address of welcome by the Hon. T. N. Gorman.

Mr. Cheadle said: "Gentlemen, if there is one fact that I would impress more than any other it is this: Give the people a 'square deal,' be honest with them, be frank with them, take them into your confidence, tell them what you propose to do; build good telephone plants, give good service and charge a good price. The American people are not a nation of paupers; they are willing to pay the price. They glory in paying the price—if you will only give them their money's worth. Do not depreciate the value of your efforts; do not depreciate the value of the service that you give."

The treasurer read his report, and stated that fourteen additional companies had joined the association.

The chair appointed the following committees:

Auditing Committee—E. W. Murray, Aurora, chairman; C. H. Hankins, Decatur; Robert C. Criffield, Minier.

Committee on Credentials—F. M. Ashe, Kewanee, chairman; Roy McCabe and E. W. Bullock.

Committee on State Organization—C. B. Cheadle, chairman; C. W. Buffum and A. G. Hawley.

D. R. Craig, of Aurora, Ill., not being present, his paper on "City Exchange and Underground Construction" was read by Vice-President C. A. Camp.

E. S. Sterrett, of Henry, Ill., not being present, Secretary Schuler read his paper on "Rural Exchange and Line Construction."

This paper was discussed by C. R. Conklin and others and the meeting then adjourned until eight P. M.

The second meeting was called to order by President G. H. Glass and Mr. Cheadle, of Joliet, Ill., introduced James B. Hoge, of Cleveland, whose subject was "State Organizations."

Mr. Hoge said in part as follows: "The matter of State organization, or of organization, is one that is very prominent now in the telephone movement.

This afternoon at the meeting someone quoted Mr. Sheerin's address at the Buffalo convention. At that time the State of Illinois had in round figures fifty-five thousand Independent telephones and something less than twenty-five thousand of Bell. The last statement that I heard Mr. Sheerin make on that statement showed the Independent to have sixty thousand and the Bell company something less than forty thousand. In all, the Independent have in round figures 180,000.

During this period over two hundred million dollars has been invested in the Independent telephone business. Practically no part of that has come from Wall Street.

We have more telephones to-day in the Independent system than what our competitors have in their system. I do not believe that ten per cent of our stockholders and those that have been engaged in the Independent telephone business to-day appreciate the fact that that time has arrived. We have a complete system to-day from the eastern slope of the Rocky Mountains to the Atlantic coast and on the Pacific coast. It is true that that system cannot be operated as a continuous one. Neither can the Bell system.

All we need to do is to standardize our operating conditions, build a few remaining gaps and we will have established the system that we have been striving for.

Something over a year and a half ago the so called Ohio plan of organization was inaugurated at Columbus.

The plan provides for division of a State into districts of any convenient number. In Ohio there are nine districts. In Indiana there are eleven districts, and so on in various States that work under this plan.

The plan has been worked out very successfully in the States where it has been tried, and we have found the most practical meetings are those of the district associations, where they get together and have a heart to heart talk with each other.

It has been found that in Ohio the Bell has no less

Group photograph of day operators of Independent Indianapolis companies at their outing on July 19th.

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Night operators of the Indianapolis Home and New Long distance companies at their recent outing at Broad Ripple Park, Indianapolis.

than eight or ten agents that work all the time trying to create a disturbance. Their hope seems to be in breaking up the organization and breaking up the Independent companies. They have tried to get them dissatisfied with their plan of operation, and promised them all sorts of conditions, but we have had very few cases where they have given us any trouble to speak of at all.

There have been four principal points that the National association has undertaken to make specially strong; first, standardization of equipment; second, standard rules of operation; third, accounting, and fourth, advertising.

We believe by standardizing our equipment, that we will be able to get better results from an operating standpoint, simplify the matter of engineering, and, at the same time, bring our systems so close together that they can be operated as a unit.

The matter of operating rules and regulations you will see at once is of great importance, because an operator in the exchange here who has worked under different rules from those at Springfield or St. Louis, will not be able to give satisfactory results.

The matter of accounting is likewise very important. At the meeting in Chicago we had committees on those different points, and they reported certain definite details.

Someone sugesgted to-day that "Honesty is the pest policy." I think if there is any class of people that have succeeded under that policy beyond others it has been the Independents. They have from the start taken the public into their confidence, and in practically every case have dealt with them on an honest basis. Our competitors have been trying in every way possible to convince the public that they were the ones that were trying to save them from all sorts of disappointments and all sorts of loss from their foolish investments; while, in reality, they are the ones that have been charging extravagant prices for years for the services rendered.

I am told that the figures in this State show that you have 106,932 telephones in eighty-one counties out of one hundred and two counties in the State. It likewise shows the Bell Telephone Company has only 39,857 telephones in the same territory.

There is no business in this world where a community of interest can be so helped as in the telephone business. We depend upon each other every hour in the day. We should be organized on a much closer basis than we are to-day. We are not doing enough organizing. We are not accomplishing enough in our various counties and districts. I believe that all that is necessary is to get our shoulder to the wheel and get started. Not only should we divide the territory, but we should also take up the territory that is not developed."

A. L. Tetu, of Kentucky, spoke upon the importance of organizing, saying that the Bell was recovering from its first shock and henceforth would put up a harder fight than ever.

It was moved, seconded and adopted, that the chair appoint a committee of not less than nine members to make a report on State organization. The committee was as follows: C. B. Cheadle, Joliet, chairman; A. G. Hawley, Dixon; C. F. Hankins, Decatur; Hon. O. F. Berry, Carthage; J. W. Barrett, Pekin; C. O. White, Princeton; H. Bassett, Kinlock Telephone Company, St. Louis; James Cochran, Rockford; E. D. Boynton, Pleasant Plains, Ill.

J. W. McNeeley, of Petersburg, and W. B. Cooney, of Pekin, spoke on the importance of organizing at once, and Mr. Parsons also spoke on the importance of a State organization.

The meeting then adjourned until nine o'clock the next morning.

After the third meeting was called to order by President G. H. Glass, the convention took up the question box, and the report of the committee and their answers to the queries.

Some of the questions that came up induced a lively discussion, many of the members giving their opinions on different matters. Mr. Conklin led the discussion and gave some very practical advice in relation to the different matters under consideration.

The report of the Committee on State Organization was then read, discussed and adopted.

The following officers were then elected: C. R. Conklin, of Aurora, president; Mr. Savage, of Champaign, vice-president; C. B. Cheadle, of Joliet, secretary, and Mr. Hankins, of Decatur, Ill., treasurer.

The meeting then adjourned until two o'clock.

The fourth session was called to order by President C. R. Conklin.

The following vice-presidents were elected to their respective districts: Mr. Venier, of Kankakee, fiirst district; Mr. Frank Zinnell, second district; Mr. Ash, of Kewanee, third district; Mr. Wasson, fourth district; Mr. Glass, fifth district; Mr. McQuiston, of Monmouth, sixth district; Mr. Ramsey, of Auburn, seventh district; Mr. H. H. Knipe, of Marshall, eighth district; Mr. Bassett, ninth district; C. E. Hull, tenth district.

There being no representative present from the eleventh district, the matter was referred to the Executive Committee.

It was moved, seconded and carried that the president appoint the Executive Committee.

Mr. Glass then took the chair.

After Senator Berry had read an interesting paper on "Value of Independent Telephone Securities as an Investment," the convention took up the question box. There were quite a number of questions, and they were all discussed at some length.

It was then moved, seconded and carried, that the two remaining speeches, instead of being delivered orally, be sent to the secretary to be published.

A vote of thanks was then extended to the manufacturers, newspapers and the news agencies, the city and Board of Trade, and also to James B. Hoge and all others that had helped to make the meeting a success.

C. R. Conklin then gave out the names of those who are to act for the ensuing year on the Executive Committee as follows: C. H. Hankins, of Decatur; O. F. Berry, of Carthage; C. E. White, of Bloomington; M. Savage, of Champaign, and James N. Barrett, of Pekin.

It was moved and adopted that the Executive Committee should see to the publishing and circulating of the paper presented by Senator O. F. Berry, that the officers be instructed to join the National Association, and that the sign adopted by the National-Interstate Association be adopted by this association.

The convention then adjourned.

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THE EDITOR'S PAGE

HIGH TENSION LINES AND TELEPHONE CABLES.

SIXTY thousand volts pressure is admittedly hard to control. It represents an engineering problem, not only to the power transmission expert, but to the telephone cable manufacturer as well. In other words, the extensive employment of high tension apparatus in all well settled localities means an ever present risk to all installations of telephone cables in those vicinities. The risk falls not only upon the exchange, but becomes an added responsibility to the manufacturer, which virtually amounts to guarantees on his part with respect to his product. At Niagara, the birthplace of power transmission in America, the variety of currents employed are a standing menace to the integrity of all telephone installations. The situation thus created, becomes a question on the part of the telephone companies of the kind of protection to employ. In other words, the degree and nature of the protection supplied to the system is a measure of the life of the cables. A cable once affected by stray currents is so badly injured that it is never good for very much afterward.

It is evidently a matter of greater economy to use preventative means than meet so great a risk and subsequent expense through neglect. The commercial pressures have risen to figures ranging from 5,000 to 60,000 volts, and the sparking distances have been found through a series of tests, to range from about a quarter of an inch to between four and five inches. The construction of telephone cables is not such that they are capable of resisting the effects of stray currents leaking from high tension sources of energy. In fact the deterioration of cables, in close proximity to power lines, is a constant source of argument and litigation.

Electrical engineers realize that insulation becomes aged and loses much of its original powers of protection when exposed continually to the influence of a sinusoidal voltage. It becomes doubly so when the intensely percolative influence of a destructively high pressure is added to it. The inductive influences radiating from these centers of force are also a great cause of embarrassment in spite of transposition and distance. On the whole, between the actual risk of deterioration and the disturbing influence extending from them, high tension lines are the worst proposition with which telephone companies have to deal. Their only safety lies in the widespread use of protective measures. The liberal employment of fuses will certainly bring the best success.

DISTURBANCES IN TELEPHONE CIRCUITS.

COMPLETE metallic circuits are necessary in telephone service because of the frequently disturbing presence of earth currents. It was not untll 1838 that Steinheil discovered the conductivity of the earth, and his discovery was due to his effort to use the track of a railroad as a return for a telegraph system. But telegraph instruments and telephone appliances differ so much in sensitiveness that the whole trend of investigation in the telephone field was directed to the purpose of preventing disturbances in telephone circuits. Metallic circuits offered the only immediate solution to this problem, and even then it was necessary to suspend the wires in a certain relation to each other.

This accomplished, a further reduction of certain electrical phenomena became necessary. Disturbances in telephone circuits may assume a negative phase, with respect to the possibilities involved in them. There may be no disturbances at all after a certain length of line is employed, the electrical energy transmitted may be swallowed up or absorbed. On the other hand, it may be so retarded in its free transmission as to utterly preclude the possibility of distant speech. A few remedies have been used for the purpose of redeeming the situation from these evils. Among them the concentric cable appears as the most effective for practical use, but with one serious drawback. It meets every condition but that of reducing the electro static capacity. Ideal in every other way, it represents an extended condenser, whose retarding influence upon messages is more and more apparent with increasing distance.

One of the most curious of phenomena witnessed in connection with transmission cables has been that of the effect of the cable upon the current at the receiving and at the transmitting end. The effect is much more marked when the cable is at the receiving end. In this instance, it is by far more injurious to the transmission of speech. Whether the electro motive force at the transmitting end of the line is higher and for this reason the attenuation of the current less, because of the limited degradation of current, it would be hard to say. Whatever may be the cause, the fact that the arrangement of the parts of a circuit have an effect upon the usefulness of the line, and the degree to which disturbances exhibit themselves, is sufficient evidence that remedial measures can be partly adopted. In other respects, disturbances in telephone circuits belong to the category of necessary evils. They are largely modified by insulation, transposition, position of the terminating cables and the selection of low capacity cables. It will not be long before all injurious influences will be, for all practical purposes, entirely removed.

SOME FEATURES OF TELEPHONE DEVICES.

THE resistance of telephone circuits and appliances becomes a matter of careful consideration; when any change in this respect tends to affect the efficacy of the system. Although the energy actually effective in producing sound is but a small fraction of that impressed upon the transmitting end, the ultimate dissipation of it is due to the resistance of the line and other parts constituting the system as a unit. At the transmitting end the primary of the induction coil for local battery operation averages about one-quarter of an ohm. Through this resistance and that of the carbon within the transmitter, the original quota of electricity passes. As far as the process of transmission is concerned it is evident that it is essentially one of transformation.

The first projection of energy upon the system occurs at the induction coil. Here the transformation of the original current variation into magnetic energy takes place. And at this point, in addition, the magnetic energy plays its new part, as the means whereby the secondary is able to reproduce the delicate changes of the primary. In this secondary a resistance of from forty to two hundred and fifty ohms is necessary. In the receiver a resistance of over seventy-five ohms. It is thus readily seen that the problem of adjusting resistances to meet modern telephone requirements, because of the high attenuation of the circuit, cannot but be regarded as one of the triumphs of telephony. It would have been difficult, indeed, to await the results obtained by purely theoretical analysis, and then to attempt the construction of telephone appliances and currents. Differences of an almost infinitesimal character compose the phenomena of speech transmission. The development of these differences to their fullest extent is largely a matter of practical experiment. Yet, even when so called, such experimenting belongs to the field of fine scientific work.

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The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

THE HEIGHT OF TELEPHONE WIRES.

A certain railway company operating in this vicinity is endeavoring to force the raising of our telephone wires from twenty-three to twenty-five feet. What is the legal height of telephone wires above the ball of the rail?

J. E. L.

THERE is no fixed height at which telephone wires must be placed. The height in every case depends on circumstances. Where wires are suspended over railroad tracks they should be maintained in such a condition as not to interfere with the operation of the railroad, or so as to endanger the lives of the employes of the railroad. The wire should be at such a height as to permit the passage of cars of ordinary height with a person standing thereon, but need not be so strung as to permit the passage of cars of unusual height with persons standing on the top thereof. Gross v. Railway Company, 73 III. App. 217.

NEW POLE TAX LAW IN PENNSYLVANIA.

Can you give me the substance of the new law passed by the Legislature of Pennsylvania bearing on the imposition of exorbitant pole taxes by boroughs in the State?

S. B. S.

THE substance of the act to which you refer, is, that any company maintaining poles upon which taxes are imposed by a borough, can petition the court upon the ground that the tax is excessive. If the court decides that the tax is excessive, the judge is to fix what he deems an equitable amount and this is to stand as the tax for two years, at the end of which time a readjustment may be made. The law applies not only to telephone companies, but to electric light, telegraph, trolley and other electric companies. It was signed by Governor Pennypacker on April 17, 1905. Prior to the passage of this act, the only remedy a telephone company had was to refuse to pay the tax and subsequently defend a suit by the borough to collect the amount due. An action has already been brought under the law by the United Telephone & Telegraph Company against the imposition of a tax by the borough of Carlisle.

CONSTITUTIONALITY OF LAW PERMITTING ERECTION OF POLES IN STREETS WITHOUT PAYMENT.

AT Chattanooga, Tenn., Chancellor McConnell has entered a decree in the case of H. J. A. Frazier vs. the East Tennessee Telephone Company, in which he holds that the telephone company is liable to damages in erecting telephones in front of the property of the complainant. In this case the attorneys for the telephone company cited a law which was enacted several years ago, giving telephone and telegraph companies the right to erect telephone poles anywhere on the side of the streets without paying for the right, but the attorneys for the complainant contended that this is contrary to the spirit of the constitution and the law in question may be pronounced unconstitutional. The case has been appealed.

CITY'S AUTHORITY TO REGULATE RATES.

IN September, 1902, Kansas City adopted an ordinance fixing the maximum rate to be charged by telephone companies for their services in that city. One James W. Garner requested the Missouri & Kansas Telephone Company to furnish him a telephone in his office at the maximum rate fixed by the ordinance, which he tendered, but the company refused to furnish it at that rate. Thereupon he brought suit for a writ of mandamus to compel the company to furnish the telephone. The principal defence pleaded by the company was that the city had no authority to enact an ordinance.

The constitution of Missouri (Art. 9, Sec. 16) provides that any city having a population of more than 100,000 may form a charter covering its own government "Consistent with and subject to the constitution and laws of this State." The so-called "Enabling Act" of 1887, providing the means for the cities to avail themselves of that constitutional privilege, declares that such city shall have exclusive control over its public highways, streets, etc. Section 51 declares that it snall be lawful for any such city in such charter to provide for regulating and controlling the exercise by any person or corporation or any public franchise in any of the streets of the city, whether such franchise has been granted by the city or by the State.

Under this act Kansas City, in 1889, adopted its charter, literally embodying therein the said two sections. Article 3, Section 1, of the charter provides that the city shall have power by ordinance to regulate the prices to be charged by telephone companies and to compel them and all other persons and corporations using electric wires for any purpose to put their wires under ground and to regulate the manner of so doing. The charter also contained what is called a "General Welfare" clause, which authorized the city to pass any ordinance that might be expedient in maintaining the welfare of the city, or might be necessary and proper for carrying into effect the provisions of the charter.

The court held that while the enactment, by the city, of an ordinance, fixing the maximum rate to be charged by telephone companies for telephone service in the State was expressly authorized by the charter, the State had not delegated to the city the power to exercise such authority in forming its charter, and that the ordinance giving the city the right to regulate rates for telephone service was void. Continuing, the court said that the regulation of prices to be charged by a corporation entrusted with a franchise of a public character, is within the reserve power of the State granting the franchise, or suffering it to be exercised within its borders, which power may be conferred on a municipal corporation; it is not a power appertaining to the government of the city, and does not follow as an incident to a grant of power to frame a charter for a city government. The court, therefore, denied the application for a writ of mandamus, thus holding that the telephone company might charge what it liked for telephone rental. State v. Mo. & Kan. Telep. Co., 88 S. W. 41.

INJURY CAUSED BY UNFASTENING OF SAFETY BELT.

A LINEMAN was engaged in putting a cross-arm on the top of a pole and in stringing wires on this cross-arm. He was provided with a pair of climbers and a strong leather belt, which was buckled around his waist. On each side of this belt was a ring, into which a section of safety belt was fastened by means of metallic snaps when he was working on the pole. Another lineman had placed a lower cross-arm on the pole, from which a bolt protruded through the side of the cross-arm. As he worked this bolt came in contact with the spring of the snap which fastened his safety belt to the ring in his body belt and loosened it from his body belt. This caused the plaintiff to fall to the ground and sustain a serious injury. The lineman suing the company charged as negligence that the bolt was half an inch longer than usual. The court held that, there being no evidence that the company knew of the unusual length of the bolt, it was not liable for the damages received by the lineman.

Lincoln Gas & Electric Light Co. v. Thomas, 104 N. W. 153.

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IN THE OPERATING FIELD.

COMPARATIVE STATEMENT OF TAX RETURNS OF THE INDEPENDENT TELEPHONE COMPANIES IN INDIANA 1904-1905.

THE following comparative statement of the Independent development in Indiana is compiled from the returns of 228 companies representing 84 counties in 1904, with 20% added for 100 companies not reported, and the tax returns of 305 companies in 84 counties in 1905, to which is added 20% for 100 companies not reported:

		Increase.
Number of telephones 1905.....	133,874	
Number of telephones 1904.....	106,554	
1905 gain in number of telephones.	27,320	26%
Total capital stock 1905.....$9,355,780.00		
Total capital stock 1904.....	5,834,252.40	
1905 gain in total capital stock....$3,521,527.60		60%
Captial stock issued 1905.....$7,868,216.10		
Capital stock issued 1904.....	5,261,257.20	
1905 gain in capital stock issued...$2,606,958.90		50%
Bonds outstanding 1905.....$3,463,680.00		
Bonds outstanding 1904.....	2,352,180.00	
1905 gain in bonds outstanding....$1,111,500.00		47%
Gross annual earnings 1905.....$2,430,191.22		
Gross annual earnings 1904.....	1,375,045.34	
1905 gain in gross annual earnings.$1.055,145.88		77%
Net annual earnings 1905.....	$429,043.80	
Net annual earnings 1904.....	310,928.24	
1905 gain in net annual earnings..	$118,115.56	35%
Operating expense 1905.....$1,847,763.55		
Operating expense 1904.....	1,105,659.92	
1905 gain in operating expenses...	$742,103.63	67%
Improvements paid out of earnings 1905	$112,846.76	
Improvements paid out of earnings 1904	70,728.86	
1905 gain in improvements paid out of earnings	$42,117.90	60%

Deducting from the gross annual earnings for the year 1905 the operating expenses for the same year leaves net earnings of $582,427.67.

Deducting from the gross annual earnings for the year 1904 the operating expenses for the same year leaves net annual earnings of $269,385.44, making the 1905 actual gain in net earnings $313,042.25. 116%.

UNION TELEPHONE COMPANY, OF GALESBURG, ILLINOIS, TO EXTEND ITS SYSTEM.

EXTENSIVE improvements which will necessitate the expenditure of $50,000 are being considered by the Union Telephone Company, of Galesburg, Ill. Long distance copper metallic circuits are to be built from Galesburg to Rock Island, Davenport, Burlington, Quincy, Springfield, Aurora, Peoria and other cities.

The company has voted to increase its capital stock from $150,000 to $250,000, and will build a two-story building for a central office. The estimated cost of this proposed structure is $10,000.

The assets which will be realized from the increased stock issue will be largely devoted to the improvement of long distance facilities. Copper wires will be substituted for the steel ones in use at present and extensions will be made in all directions out of that city.

CANADIAN MUNICIPAL LEAGUE IN FAVOR OF GOVERNMENT LONG DISTANCE LINES.

AT the annual convention of the League of Canadian Municipalities, held at Winnipeg, Manitoba, July 27 to 29, the following resolution was carried and will be sent to the Dominion Government at Ottawa:

"That this convention hails with satisfaction the inquiry into the telephone conditions at present existing in Canada, carried on during the past session of Parliament by the select committee on telephone systems, under the able chairmanship of the postmaster general. We congratulate the Government upon the voluminous and valuable information regarding this important question, which has been secured by the committee and placed at the disposal of the municipal and other public bodies in the Dominion. This convention is strongly of opinion that the time has arrived when the long distance telephone service should no longer be operated as a monopoly for private gain, and that this service should be owned and operated by the Federal Government, under conditions which will enable every telephone user to have unrestricted intercommunications between all local systems now in operation, or which may be hereafter established."

FARMERS AT MACK, OHIO, OUTWIT THE BELL COMPANY.

AN incident in which the Bell company was outmanœuvred recently took place in Mack, Ohio. The Hamilton county, Ohio, commissioners had granted a franchise to the Bell company to erect a pole line along the Cleves pike. This pike is one of the best in the State and was built by farmers through assessments on the abutting property for a mile on each side of the road. Recently it was sold to Hamilton county. The farmers living along the pike being unable to secure service from the Bell at reasonable rates, organized the Cheviot, Mt. Airy and Grosbeck Telephone Company and an exchange connecting the three towns was installed.

The Bell immediately secured a permit from the county commissioners to erect poles from Cheviot to Cleves. The farmers opposed it from the start, but by dodging first from one side of the road to the other the company's men completed the line as far west as Mack. At this point a determined stand was made and the farmers filled up the holes as fast as they were dug. In desperation the Bell foreman ordered his men to lower a pole into a hole in which a boy had jumped. This the men started to

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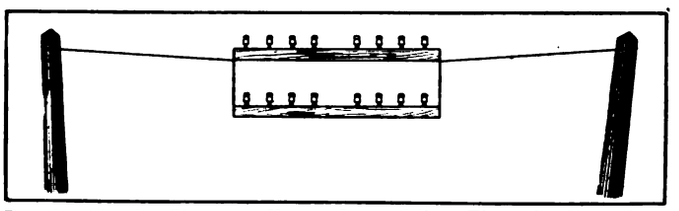
IN THE OPERATING FIELD

do and as the boy did not move the pole injured him in its descent. This so enraged the farmers that they went for the linemen, who beat a hasty retreat. The Bell has since apparently abandoned the work.

SUGGESTED METHOD OF PREVENTING INJURY TO SHADE TREES.

FREQUENTLY when putting up a pole line for telephone or electric light wires along the side of a street, the workmen utterly destroy the beauty of shade trees by cutting away large branches," says W. E. McChesney in Popular Mechanics.



Drawing Showing Fixture to Use on Streets Where There Are Many Trees.

"Even with this defacement there is apt to be frequent interference with the wires when the wind blows, or during a severe storm. At all times the wires are liable to cut into limbs or tree trunks. A remedy is suggested in placing a pole on each side of the street and suspending an ordinary cross arm from a strong wire extending from pole to pole. When the trees have been passed the line wires can be turned to the ordinary single pole placed near the curb."

BELL OFFERS TO SELL ITS PLANT IN HAMMONTON, NEW JERSEY, TO INDEPENDENT COMPANY.

TACTICS similar to those used elsewhere by the Bell, are being employed by the Bell in New Jersey. Arrangements are being made to install an Independent system in Hammonton. When the Bell heard of this move, it at once commenced to improve its system and changed its service from day to continuous. It has offered inducements to the promoters of the Independent company to connect with its system and has offered to sell its plant to them for a nominal sum. It is however, the general opinion that the company will be thoroughly Independent and will connect with the Keystone system of Philadelphia for long distance service.

EGG HARBOR, N. J., COMPANY HAS A SUCCESSFUL FIRST YEAR.

THE report of the first year's business of the Egg Harbor, N. J., city Telephone Company is most gratifying. The company started operation on July 1, 1904 with about 50 subscribers. The Bell Company at that time had some 38 telephones in operation here, this number has since decreased to three pay-stations. The Egg Harbor Company, on the contrary, has increased its list to 126 subscribers and has several waiting for service.

With a view to regain lost subscribers, the Bell put several solicitors to work, but notwithstanding reducing its rates from $25 to $12, it failed to regain a single subscriber. After canvassing the entire town, the farmers were solicited. Big promises were made to them and they were told that the Independent Company would connect with the Bell, but without avail. The company has enlarged its system, and put up additional cable. Recently a contract was received for an Independent telephone to be placed in the *Bell Exchange* to be used in calling subscribers of the local company to the Bell Exchange. The extensive improvements necessitated increasing the capital to $100,000. The present officers are: George W. Otto, president and general manager; Henry Voss, vice president; H. C. Schlichting, secretary; Lorenze Krein, treasurer.

ONLY ROOM FOR ONE COMPANY, THE INDEPENDENT, IN MERIDEN, KAN.

ONE of the strongest cards the Bell has had to play in the past has been the uselessness of another system where it was in operation. In Meriden, Kan., the tables have been turned upon them, the general trend of opinion being against the Bell and in favor of one company, the Independent. The Bell Company owns no telephones in the county, so we are told, having only contracts to connect with a mutual company having leased Bell telephones. By holding fast to the Bell the mutual company gets nothing which it could not get from the Independent company and loses connections with about 1,500 telephones in the surrounding country.

It is pointed out that Independent toll connections are worth more than Bell to Jefferson county patrons, because there are ten times as many telephones in the county. Independent lines reach Topeka, Kansas City, St. Joe and 300 other towns.
towns.

MICHIGAN COMPANY SUCCESSFUL AFTER TWO YEARS' FIGHT.

THE Independent Telephone Company of Ypsilanti, Mich., which has been fighting for a foothold in that city for two years, has placed its exchange in the Batchelder block in operation. Previously the company had four telephones in the city connected with the Ann Arbor exchange, but these have been cut over to the local board, and new ones are being put in as rapidly as the work can be done. In two days seventy-five contracts were signed, largely among the business men.

The company has had to fight for every inch it has gained, being finally compelled to enter upon its state rights.

For more than a year it was kept out of the city by the refusal of the Council to grant it a franchise.

As soon as it began to tear up the pavements to put in the underground system, it was enjoined by the city, and the case was taken to Ann Arbor, where the injunction was dissolved. Since that time the company has been working as rapidly as possible.

The common battery lamp signal system has been installed, whereas the Michigan company against which it competes has the old magneto system.

WANTED—IDEAS

THE results of the call for contributions which has been appearing on the operating field pages for the past two months has been most gratifying. We believed that there were numbers of our readers who had good ideas and only required the suggestion to make them public. Still there are many things being done in secret as it were, which we are certain are of enough importance to become public. These are what we wish to hear about and what our readers wish to know as well. If you have an idea, no matter how simple, it undoubtedly has some value. Send it to our editorial department. Its only necessary qualification is that it must apply to telephone operation. Fiction or poetry is unavailable. Accepted articles will be paid for the 10th of the month following publication.

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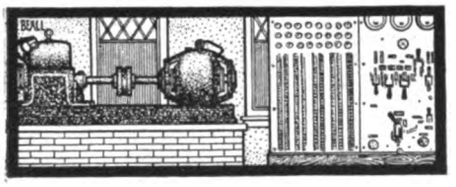
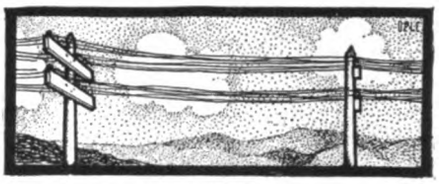


QUERIES

Questions on any subject relating to telephony will be answered on this page.



OPERATION OF KICKING COILS—(590.)

Will you please show the circuit and describe the operation of a kick coil telephone whereby the central office may be signaled without a magneto generator? M. V. R.

Figs. 590 a, b and c show a commercial type of kick-coil telephone, the points marked *T* and *S* being the tip and sleeve binding posts. The exchange is called by simply removing the receiver from the switch hook, which act allows the springs *b* and *d* and hook lever spring *c* to make a momentary contact with each other, as shown in Fig. 590 (b), thus allowing the battery current to flow through the primary of the kick coil, spring *d*, hook lever *c*

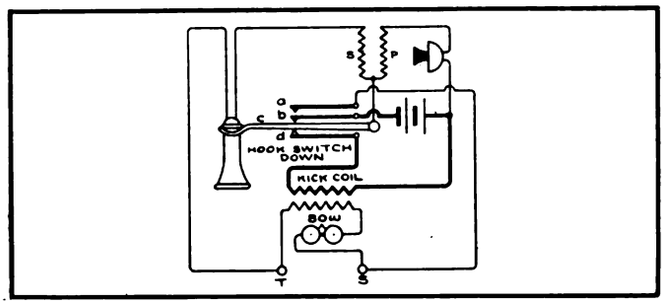


Fig. 590A.

and spring *b*, back to battery. This causes an impulse of current in the secondary of the kick coil, which finds a circuit through the 80 ohm ringer, one side of line, switchboard drop, other side of line and back to the other terminal of the kick coil or secondary. The coil is so designed that this impulse of current is sufficiently strong to operate the drop through the longest lines met with in practice.

Fig. 590 c shows the telephone circuit with the hook switch lever in its extreme up position, the connections then being proper for

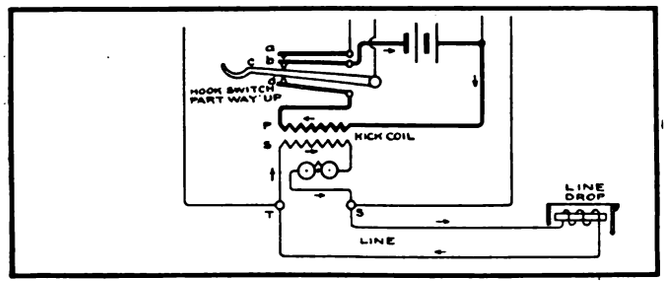


Fig. 590B.

talking. It will be noticed that the hook switch spring *d* is now open, thus preventing waste of current through the kick coil. The kick coil and ringer are permanently connected between the binding posts *T* and *S* and will be left bridged across the circuit while talking. Their impedance, however, is very high, so that no appreciable cutting down of the transmission will result.

A kick coil for use in this type of telephone was described in THE AMERICAN TELEPHONE JOURNAL, July 8 issue, query 575.

CONDENSERS—CAPACITY—(591.)

1. Why can a condenser, bridged across the battery leads at a private branch exchange switchboard, which gets current from the main exchange, prevent cross talk?

2. How can I calculate the capacity of such a condenser? M. E. B.

The reason for cross talk from one line circuit to another at a private branch exchange which gets current from the main exchange battery is that the resistance of the battery connections to the exchange are so high that the variations in pressure at the bus bars *D* and *E* (Fig. 591), due to voice currents in, say, line No. 1 will effect all other line circuits, No. 2, connected to the same bus bars. The greater the resistance of the battery leads to the main exchange the more the cross talk. The condenser *C* bridged across the battery bus bars will tend to absorb these variations in pressure and thereby prevent them affecting

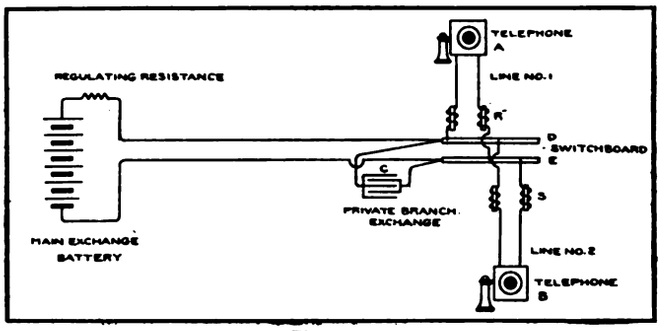


Fig. 591.

other lines. The capacity of the condenser should be such as to have a very low reactance to voice currents and is usually of at least 20 micro farods for medium-sized private branch exchanges. There is no direct method of figuring the necessary capacity. All practical results have been derived from experiment.

RINGING TROUBLES—(592.)

I am in doubt as to the cause of the following trouble: One of our party lines is nine miles long and is bridged with twelve instruments having 1,600 ohm ringers; there are also two extension bells of the same resistance on the line. On test the bell rings well from stations three or four miles away. The trouble generally occurs in damp weather. T. P. C.

Because of the trouble occurring in damp weather it is reasonable to suppose that your line is not well insulated and that therefore the leakage across the lines due to moisture is the trouble. Go over the line carefully and examine all insulators, replacing

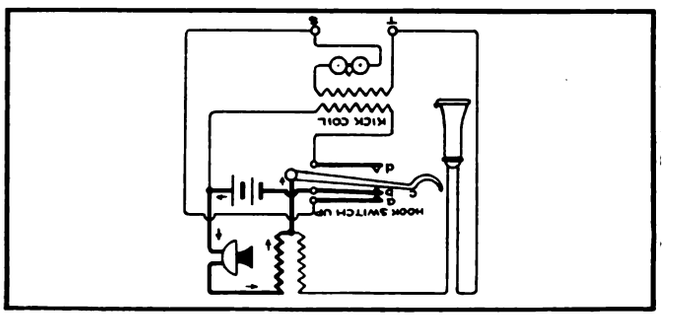


Fig. 590C.

those that are damaged. The drop lines leading from the poles to the houses should be overhauled and if found defective repaired. If bare wires are used for this purpose it is important that they should be thoroughly insulated from each other and the houses. For this reason it is preferable to use regular type glass insulators instead of knobs, as the petticoat of the glass offers a very high resistance path between the wires and the pins. If knobs are used there is every possibility of them being coated with a film of moisture which will extend over the building between them and thus furnish a short path. It will readily be observed that several such paths will lower the resistance between the two sides of the circuit and cause a greater portion of the ringing current to be shunted across, thus limiting the available amount for operating the bells.

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TELEPHONE PATENTS

TELEPHONE CURRENT REINFORCER.

Herbert E. Shreeve, of Newton, Mass.; patents (No. 791,656; dated June 6, 1905; filed Feb. 28, 1905; serial No. 247,691; and assigns by mesne assignment to American Telegraph & Telephone Co. of New York); a telephone current reinforcer or relay.

By this device the currents employed in telephony are reinforced or augmented, particularly when neighboring circuits may affect the speech transmitting line deleteriously through their inductive influences. By this invention telegraphic or other undesired currents of relatively low frequency are strained out.

It consists of a combination of the compound telephone circuit, or the united circuits or circuit sections, which form the through

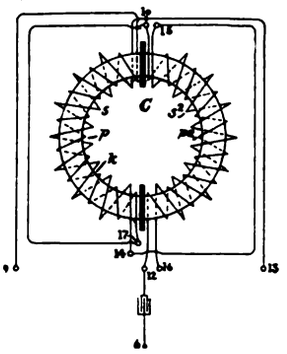

Fig. 1.

line of communication, and a reinforcing relay with a repeating induction coil of small mutual induction. The repeating induction coil has its primary winding connected over the common iron core differentially. The currents induced in the differential secondary windings are arranged to coincide in direction.

In Figs. 1 and 2 are shown respectively a diagrammatic sketch

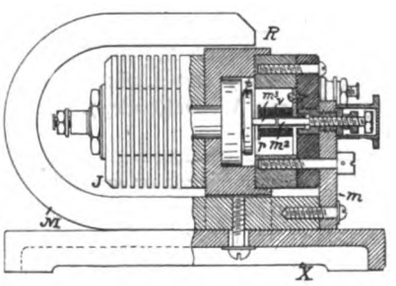

Fig. 2.

of the augmenting mechanism called a repeating coil, with its characteristic windings, and a cross sectional view of the coil as constructed for service. In Fig. 2 *J* is entitled by the inventor a scored heat radiating mass, M^2 being a fixed iron core and M^1 a vibratory core developing the responsive motions due to varying voice currents which lead to amplification.

AMPLIFYING TELEPHONE WAVES FOR LONG DISTANCE TELEPHONY.

Cornelius D. Ehret, of Washington, D. C., patents (No. 789,087; dated May 2, 1905; filed December 3, 1901; serial No. 84,512); an improved system of amplifying telephone waves. This invention relates to a method of transmitting and amplifying electric waves used in signaling, particularly telephony. The idea is to add energy to the waves after they have traveled along the circuit a certain distance. This is accomplished by using a high frequency alternating current, which, when impressed upon the circuit, is able to augment those waves which have become attenuated in transmission.

The inventor uses an induction or a synchronous generator which boosts or amplifies the current. The process relates to alternating current engineering, in that the generator acts as a repeater with respect to the telephone current.

MICROPHONE.

Paul J. Tariel, Issy-Les-Mouleneaux, France, patents (No. 790,603; dated May 23, 1905; filed June 30, 1904); an improved microphone. The purpose of this invention is to employ small flat plates or pellicles of carbon instead of the regular granular formation as used for the variable resistance medium in transmitters. The inventor claims greater sensitiveness is attained by the use of pellicles, and also that their liability to pack is reduced to a minimum on account of their flat surfaces.

MICRO-TELEPHONE.

Konrad Hoflinger of Vienna, Austria-Hungary; patents (No. 793,444; dated June 27, 1905; filed March 11, 1904; serial No. 197,626; and assigns by mesne assignment one-half interest to Carl Wolffhardt, Jr., of Vienna, Austria-Hungary); a micro-telephone.

The purpose of this invention is a combination of a microphone and telephone in which the necessity for removing the device from

Fig. 1.

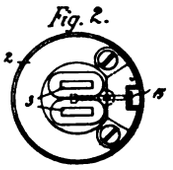

Fig. 2.

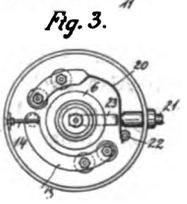

Fig. 3.

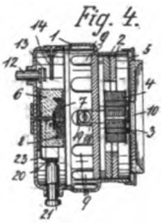

Fig. 4.

the ear is dispensed with. The sound is effectively transmitted by the bones of the skull when speech is uttered. The inventor claims the absence of foreign sounds when the apparatus is employed for the purpose intended.

It consists of a transmitter and receiver as shown in Fig. 4, the complimentary views indicated by Figs. 1, 2 and 3 supplying the details. In Fig. 1 the push button 12 serving as a third foot will enable it to be used as a table telephone. For short distances the diaphragm alone will serve as a calling device. With battery current the inventor claims that without the use of an induction coil satisfactory results in this respect are obtained.

SWITCHBOARD.

Eugene Darnell of Carrollton, Mo.; patents (No. 794,142; dated July 4, 1905; filed April 30, 1904; serial No. 205,719; and assigns by mesne assignment a one-half interest to Harry H. Wilcoxson, Lulu Wilcoxson, Harry W. Tull and Frank E. Lovell of Carrollton, Mo.); a telephone switchboard.

The purpose of this invention is to dispense with the spring jacks, plugs and cords of the telephone switchboard and thereby reduce the six different reaching movements of the operator to a less number. Its further purpose is to provide privacy between subscribers by preventing the operator from hearing the conversation.

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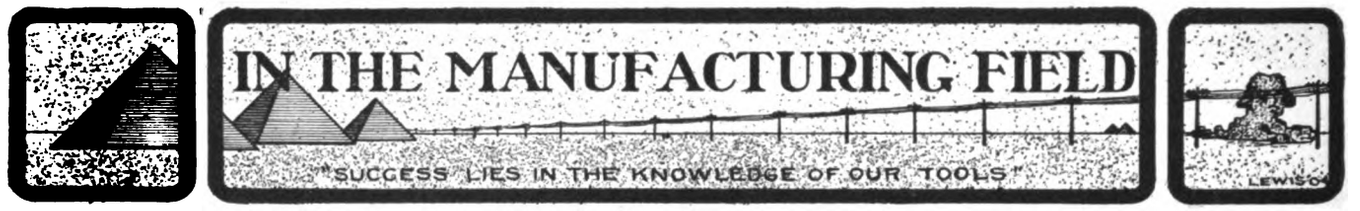

APPARATUS USED TO DEMONSTRATE THE PRINCIPLES OF CONDENSER ACTION.

THE phenomena of condensation may be conveniently illustrated by means of Epinus' condenser (Fig. 1), which consists of two circular metal plates mounted on glass legs and provided with pithball pendulums. Between these is a support for a glass plate or other solid insulator, and all of these can be moved along a support and fixed in any position.

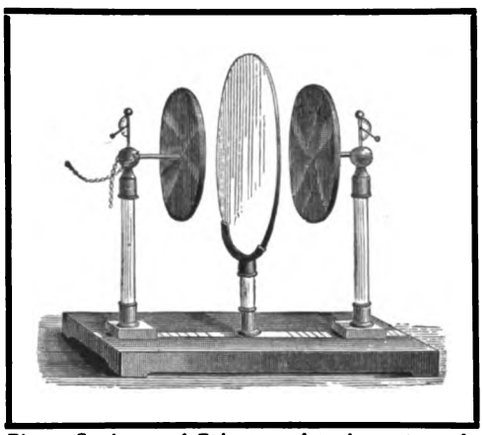

Fig. 1. Condenser of Epinus, used to demonstrate the phenomena of condensation.

If the middle plate be removed and one of the end plates, which has been connected with the cap of a gold leaf electroscope by means of a wire, is charged with a positive charge and the other plate connected to the earth, the divergence of the leaves of the electroscope will indicate the potential of the charged plate. This divergence diminishes when the plates are pushed nearer to each other, thus showing that the potential of the plate has fallen. If the grounded plate is moved away the divergence raises to the original amount, indicating that it has recovered the original potential to which it was charged in the first place.

If the two plates are placed very close together the divergence of the leaves of the electroscope will diminish and in the present case, disregarding any loss due to leakage since the quantity of electrical charge has remained the same, while the potential is lowered, it must necessarily follow that the capacity of the charged plate is increased by the presence of the second one.

With the two plates close together, it will now be possible to charge the first plate up to a point where the maximum divergence of the leaves of the electroscope is obtained, which will be the same as when the plates were far apart. The effects described are more marked and the possibility of leakage is decreased, by the plates being separated by a solid dielectric, such as glass or rubber.

From the foregoing it is clearly demonstrated that the presence of the second plate has enabled the first one to receive a greater charge than when it was alone or that its capacity has been increased. This property is called condensation. The first plate connected to the electroscope is the collecting plate and the second one is the condensing plate.

The standard air condenser (Fig. 2) is built on the principle of the condenser of Epinus and has a definite capacity. It consists of a series of metal plates very close together and separated by sheets of glass as nearly as possible free from imperfections and impurities. The metal plates are of thin sheets all of the same size, and the apparatus is built up with the plates all coming as nearly opposite or above each other as possible.

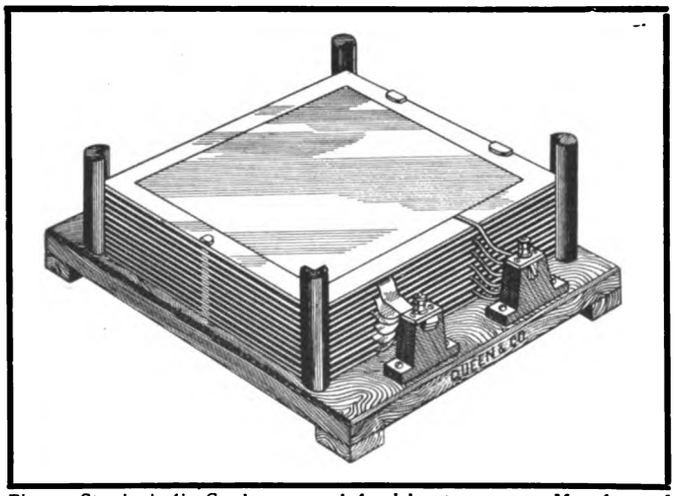

Fig. 2. Standard Air Condenser, used for laboratory tests. Manufactured by Queen & Co., Philadelphia, Pa.

The odd plates, the first, third, fifth, seventh, ninth, etc., are connected together, forming one side of the condenser, and the even ones, the second, fourth, sixth, eighth, etc., are connected together, forming the other side. In this manner a condenser having a large capacity can be constructed in a comparatively small space. The base and corner pieces shown in the illustration are merely used as a method of holding the parts of the apparatus together and the capacity of the condenser can be increased by adding plates and connecting them alternately to the binding posts in front.

This apparatus is manufactured by Queen & Company, 1010 Chestnut street, Philadelphia, who, besides devising laboratory devices, also construct a complete line of electrical measuring instruments for commercial purposes. The standard mica condenser is made of the finest foil and mica, insulated in vacuo and guaranteed to stand a 500 volt direct or a 300 volt alternating current. The top is made of highly polished hard rubber, which caps a box of polished mahogany. The accuracy of adjustment is carried out to within one-quarter of one per cent. This condenser is made in the following sizes: ¼, 1-3, ½ and 1 micro farad capacity. In addition to these there is a type called subdivided of ½ m. f. capacity, mounted in a lacquered circular brass case with polished hard rubber top. It contains two sections; when used singly each gives one-half the rated capacity and in multiple, the total capacity. Other types of condensers for students and general laboratory purposes are manufactured by this concern, which will furnish further particulars upon request.

THE INTERNATIONAL TELEPHONE MANUFACTURING COMPANY, Chicago, has equipped its manufacturing plant with a gas engine power equipment and is running an all night shift of men to double its output to meet the rapidly increasing demands for its high class telephone apparatus.

J. TROMLEY, of Phoenix, B. C., has been awarded the contract for supplying about twelve hundred cedar poles for the new telephone line being built through the boundary country, from the boundary line near Cascade to Greenwood, near Phoenix.

G. M. GEST, the expert subway contractor of New York and Cincinnati, has a large force of men actively at work in Meridian, Miss., installing the conduit system for the Cumberland Telephone & Telegraph Co. at that point.

THE W. G. NAGEL ELECTRIC COMPANY, Toledo, Ohio, is dis-

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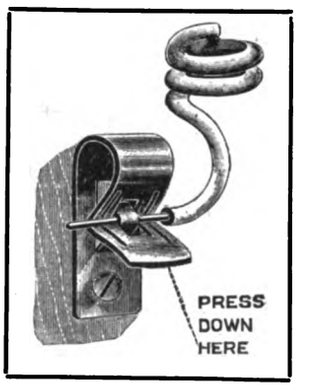

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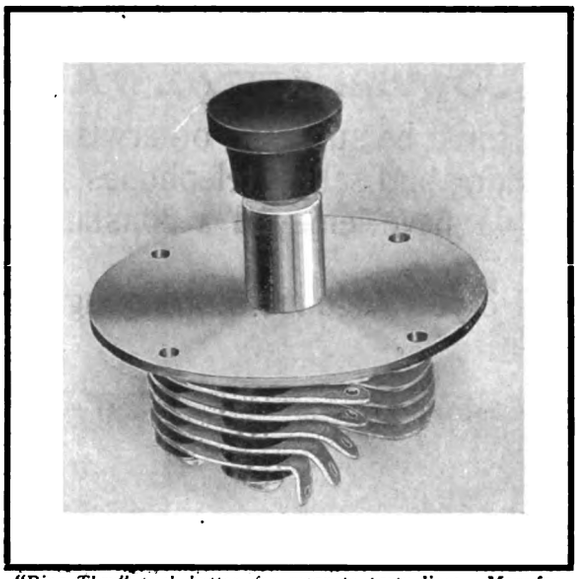
tributing an interesting card to the trade which draws attention to the 1900 battery which it handles. This battery is well known for its qualities of strength and durability. Upon the reverse of the card may be found an epigram and some interesting phrases dealing with the power of one's will to accomplish results.

NEW TYPE PARTY LINE BUTTON.

ON magneto party lines it is frequently desirable that the local circuits of the instruments shall be so arranged that the subscribers can ring each other without signaling the exchange. This requires the use of a push button or other switching device. The American Electric Telephone Company has recently placed on the market a button known as "Ring Thru," which has been specially designed for this purpose.



"Ring Thru" push button for magneto party lines. Manufactured by the American Electric Telephone Company.

By referring to the illustration it will be seen that all of the springs are of the circular type. The object in constructing them in this manner is to permit the use of a longer spring than would be possible were they otherwise. It also allows the use of a heavier grade of German silver than would be possible were the springs straight. All of the springs are mounted on a substantial and well insulated base, insuring the greatest possible rigidity and a perfect alignment of all parts.

Platinum contact points are used throughout, each contact being firmly riveted to the spring, which practice is found superior to soldering.

This button can be used on either metallic or grounded lines. Where used for the latter service the generator is wired to the button in such a way that when the push-button is not depressed it supplies an alternating current and rings the subscribers on the line when the crank of the generator is turned. When the push-button is depressed a pulsating or direct current is sent out over the line when the crank handle is turned, and this direct current will not influence the bells on the line, but will operate the drop at the exchange. In this case it is necessary to supply at the central station a relay in connection with the drop, which relay does not operate when alternating current passes through it, but does operate when pulsating or direct current passes through it. This button is further described in Bulletin 18, which will be mailed to interested parties.

THE BAIRD MANUFACTURING Co., 6 Michigan street, Chicago, Ill., reports that telephone exchanges which have tried its secret service telephone system are equipping their party lines throughout with this device. As it does away with "listening in" and constant ringing when not wanted, it is found to be a useful aid in securing new subscribers. The Baird company makes the assertion that its secret service system enables telephone companies to raise their rental rates from 50 cents to $1 without any protest whatever from the subscribers.

The company will send its booklet, entitled "Secret Service on Party Lines," to any address upon request.

The company also reports large sales of its pay stations. It desires to draw particular attention to the No. 13 new model pay station, which it claims is the height of perfection in mechanical design. Its descriptive catalogue and price list will be sent to anyone upon request.

THE AMERICAN ELECTRIC FUSE COMPANY, of Chicago, is furnishing a complete protector equipment for the Home Telephone Company, Meridian, Miss. The original installation calls for a main distributing rack with 1,300 pairs of Kaisling self-soldering protectors and an intermediate rack with an ultimate capacity of 5,000.

C. H. Judson, engineer for the Independent Company at Council Bluffs, and salesmen who bid for the apparatus.

REPRESENTATIVES of manufacturing companies bidding on telephone apparatus and supplies for the new Independent system at Council Bluffs, Ia., recently had a group photograph taken which included the engineer for the telephone company, C. H. Judson. This photograph was printed upon post cards, and is herewith reproduced.

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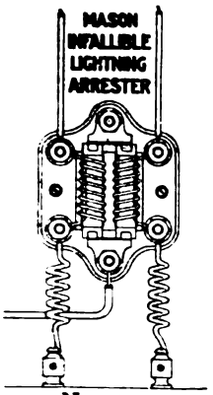


No. 2000.

Lightning Eliminated!!

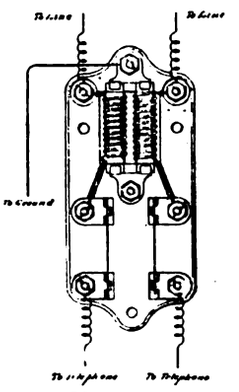
There has never been known a case where lightning has passed

THE "MASON"

Theoretically correct — remarkably efficient — a veritable barrier to lightning. Ask for Bulletin 38-S and prices.

Ewing-Merkle Electric Company

ST. LOUIS, MO.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Insulated Electrical Wires and Cables

Bare Steel and Copper Telephone Wire

JOHN A. ROEBLING'S SONS CO.

TRENTON, N. J.

Agencies and Branches

NEW YORK CHICAGO CLEVELAND
SAN FRANCISCO PHILADELPHIA ATLANTA

W. H. CRUMB & COMPANY

ENGINEERS
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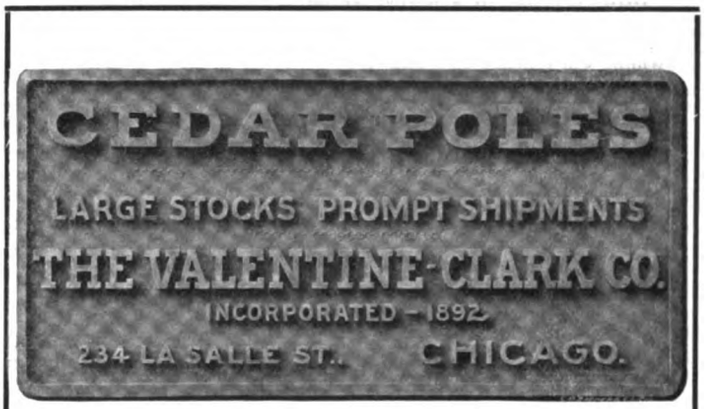
Telephone Engineering and Construction

Plans, Specifications and Estimates Promptly Furnished

Meritorious Independent Telephone Enterprises Financed

1263 Monadnock Bldg., Chicago, Ill.



Simplicity, efficiency and durability are the main points in the design of

The Archambault Kerosene Furnace

Other furnaces may appear to possess one or more of these qualities, but if you investigate you will find that in no instance is the Archambault Furnace excelled.

As it uses kerosene it is the most economical in fuel of any on the market, and it is so made that irrespective of conditions it will do its work quicker and better than any other furnace made.

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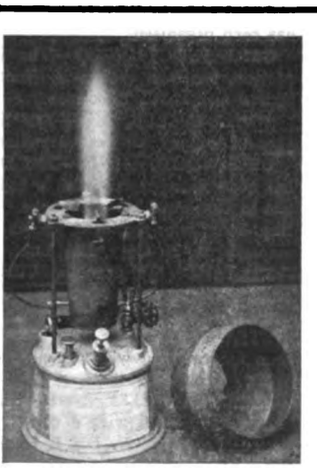
THE ARCHAMBAULT CO.

204 Lenox Avenue, New York City

OR PRINCIPAL SUPPLY DEALERS



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THE WEEK'S MESSAGES

FINANCIAL.

GRAND RAPIDS, MICH.—The Citizens' Telephone Company has increased its capital stock from $2,000,000 to $3,000,000, the increase to be used solely for the improvement of old properties and extensions of the business.

FRANCHISES.

ANNISTON, ALA.—Mrs. Britt, of El Paso, Tex., has applied for a franchise in this city.

PINNACLE, COL.—W. V. Hughes, P. I. Brown, William Hale and others in Pinnacle have been granted a franchise to construct 15 miles of telephone line within the White River forest reserve.

STROUDSBURG, PA.—The Stroudsburg & Bushkill Telephone Company has secured the right of way for its telephone line from Delaware Water Gap to Portland.

JEFFERSON, TENN.—The city has granted a franchise to the People's Telephone Company.

EVERETT, WASH.—The Farmers' Mutual Telephone Company has been granted a franchise.

ELECTIONS.

MELITA, MANITOBA, CANADA.—The Melita-Arthur Telephone Company has elected the following officers: President, D. Day; vice-president, A. B. Estlin; secretary-treasurer, T. S. Menary; directors, A. Gould and D. Bell.

HARLAN, IA.—At a meeting of the stockholders of the Harlan and Avoca Telephone Company, at Harlan, a new directory was chosen, and at a subsequent meeting J. H. Jenks, of Avoca, was elected president. Mr. Whittle will continue as manager.

COMBINATIONS.

OSKALOOSA, IA.—The Oskaloosa Telephone Company has been sold to Charles Lemley, of Richland, Ia.

TROY, N. Y.—The Commercial Telephone Company has secured controlling interest in the Co-operative Telephone Company, of Whitehall. This addition to the Commercial's lines means the placing of 1,200 additional telephones in the service, covering the territory northward to Ticonderoga and over to Hydeville, Fair Haven, Poultney and Castleton.

NEW COMPANIES.

OWYHEE, IDAHO.—A stock company has been organized here to build a telephone line from Elko, Nev. This will give direct connection from Mountain Home to Elko, Nev., via Bruneau, Wickahoney, Riddle, Owyhee, Mountain City, Edgemont and Tuscarora.

WEST TERRE HAUTE, IND.—The West Terre Haute Telephone Company has been incorporated with a capital stock of $10,000. Directors: Burton Cassaday, D. S. Gosnell and H. H. Knipe.

CRYSTAL LAKE, IA.—The North Crystal Rural Telephone Company has been organized.

CARL JUNCTION, O.—The Carl Junction Telephone Company, capital $10,000, has been chartered. Incorporators: G. A. Welbourne, H. C. Welbourne and H. C. Robertson.

SHELBYVILLE, MO.—The Shelbyville County Farmers' Mutual Telephone Company has been organized.

DEERWOOD, MINN.—The Deerwood & Bay Lake Telephone Company has been incorporated with a capital of $2,000 to operate a telephone system in Deerwood and Bay Lake. The officers are: President, A. A. Miller, Bay Lake; vice-president, O. C. Coffin, Deerwood; secretary-treasurer and manager, A. N. Gray, Bay Lake.

VILLARD, MINN.—The Villard Telephone Company has been incorporated with a capital of $10,000. Incorporators: C. F. Angell, L. F. McGray and others.

STEWARTSVILLE, N. J.—The Stewartsville Telephone Company has been incorporated with a capital of $10,000. Incorporators: L. F. Strader, W. Y. Rush and others.

MICHIGAN CITY, N. D.—The Michigan City Telephone Company has been incorporated with a capital stock of $5,000. Incorporators: Edward Litton, Larimore, N. D.; J. H. Leggett, G. F. Lamb and others, of Michigan City.

YORKSHIRE, O.—The Yorkshire Telephone Company has been incorporated with a capital stock of $10,000. Incorporators: E. A. Fisher, M. J. Brandon and others.

NARDIN, OKLA.—The High Point Mutual Telephone Company has been incorporated with a capital stock of $1,000, to operate a telephone system. The incorporators are: J. H. Dickerman, J. W. Quillian, R. W. Swayne, E. Huffman.

RIMERSBURG, PA.—The Rimersburg Telephone Company has been incorporated with a capital stock of $5,000.

MANILA, P. I.—The Philippine Telephone & Telegraph Company has been incorporated.

HUMBLE, TEXAS.—The Humble Telephone Company has been incorporated with a capital stock of $2,000. Incorporators: W. T. Campbell, W. M. Abbey and W. W. Woodworth.

TEXARKANA, TEX.—The Texarkana Telephone Company has been chartered with L. A. Byrne, of Texarkana, Ark., as agent in this state. The capital stock of the company is $150,000. The company is authorized to construct and operate telephone lines in the states of Arkansas, Louisiana and Texas. W. P. Harrison is president of the company.

TIMPSON, TEX.—The Timpson Telephone Company has been chartered with a capital stock of $10,000. Purpose: Building and operating telephone lines. Incorporators: J. E. Bussey, Frank Bussey, C. C. Murray.

CRAIGSVILLE, VA.—The Craigsville & Bell's Valley Mutual Telephone Company has been chartered. J. B. Tuttle, president; L. E. Hicks, secretary and treasurer. Capital, $5,000. Objects: To purchase, maintain, operate or lease telephone lines.

PRESTON, WIS.—The Preston Farmers' Telephone Company has been incorporated with a capital stock of $5,200. Incorporators: H. C. Shepard, A. P. Peterson and Guy Shepard.

MISCELLANEOUS.

PEKIN, ILL.—The Pekin Telephone Company has established connection with Peoria. This company has 1,300 instruments in Pekin and 230 in Saco.

PEORIA, ILL.—The Interstate Telephone Company has opened a new exchange in Peoria.

MARYSVILLE, KAN.—A meeting of Marshall County telephone managers was held in this city recently to organize a county association for the betterment of the telephone service and also to consider the advisability of building toll lines to connect the various towns of the county. Those present were: T. O. Jackson, Frankfort; W. R. Lea, Blue Rapids; J. J. Groesbeck, Waterville; P. H. Hybskmann, Vermillion; George Delaney, Axtell, and W. W. Hutchinson, Marysville. W. W. Hutchinson was chosen chairman, and W. R. Lea, of Blue Rapids, secretary. The next meeting will be held at Blue Rapids.

CADIZ, KY.—Charles R. Lackey and John S. Lawrence have purchased the Globe Telephone Company's franchise, wires, etc., and will install a new plant at once.

BENTON, HARBOR, MICH.—Walter Blodgett, of Detroit, is conducting negotiations for the establishment of a new Independent telephone exchange in this city and St. Joseph. The new company is known as the Standard Telephone Company and will have lines and central stations in all the important cities of the State. Several well known capitalists of Detroit and Grand Rapids are said to be in the company.

SOMERSET, PA.—The Somerset County Telephone Company is making arrangements to greatly extend its service. Connection will be established with the Bedford County and Western Maryland companies.

PERSONAL.

OSCAR BESSIER has been appointed manager for the Monticello, Wis., exchange of the United Telephone Company.

C. L. BRAGG has been appointed manager for the Southern Bell at Jacksonville, Fla.

C. R. CONKLIN has been elected president of the Illinois Independent Telephone Association.

JAMES CONVERSE has been appointed manager for the Home Telephone Company, at Wellington, Ohio.

J. E. COTTON has been appointed manager for the Union Telephone Company, at Sharon, Pa.

M. FRETZ has been appointed manager for the Harlan & Avoca Telephone Company, at Harlan, Ia.

H. A. HAMILTON has been appointed manager of the Ellis County Telephone Company, of Ennis, Tex.

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Kellogg Switchboard and Supply Co.

CHICAGO, ILL.

Wholesalers of **Michigan White Cedar** **POLES** *of* **QUALITY**

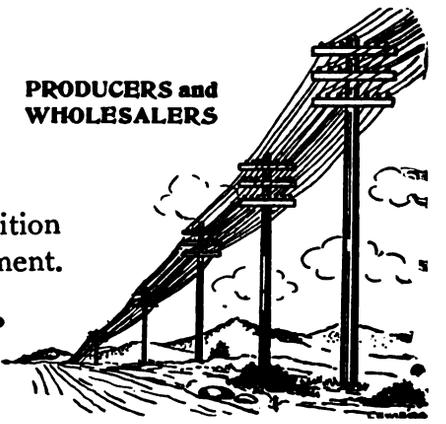
Five Yards ***Prompt Shipments***

PITTSBURG & LAKE SUPERIOR IRON CO.,
ESCANABA, MICHIGAN.

PRODUCERS and WHOLESALERS

WE always carry a large stock of all sizes of White Cedar Poles, and having yards on all principal railroads in Northern Michigan and Minnesota, are in position to make immediate shipment.

"From the Stump to the Line."



COMPARISON SHOWS THAT

Some Poles are Good;
Others are better, but the
Sand Point Cedar Company's
Are the BEST.

Because our location enables us to
Cut only that timber which has the
Necessary qualifications of
Soundness, Strength and Straightness.

Hadn't you better write us for
Quotations upon Superlative
Quality Cedar Poles?
They cost no more than the other kind.

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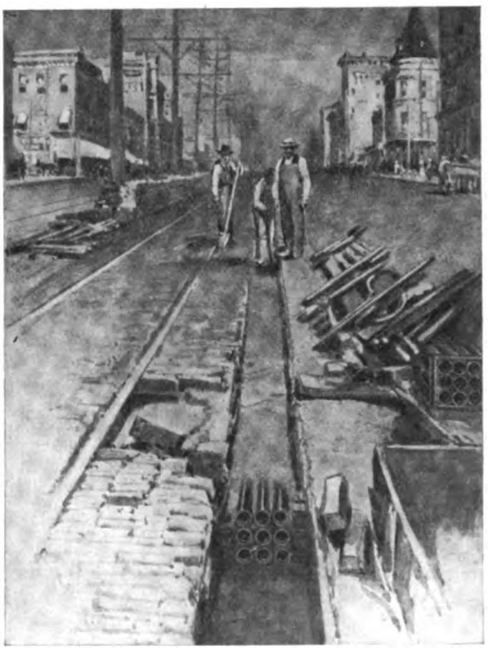
For Underground Constructios



The American Conduit Company has a corps of experts in underground construction and is prepared to furnish supervision of work if desired. We would prefer to co-operate with contractors in underground construction, but if desired will submit estimates and bids and take contracts for completed underground systems in any part of the United States or Canada.

AMERICAN CONDUIT COMPANY,
Main Offices, 1005-6 Manhattan Building, Chicago
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THE WEEK'S MESSAGES—*Continued*

ELMER HARDING has been appointed manager of the Chariton, Ia., Telephone Company.

JOSEPH HEBERT has been appointed temporary manager for the Citizens' Telephone Company, at Terre Haute, Ind.

R. R. LOUNSBERY has been appointed manager for the Nebraska Telephone Company, at Alliance.

W. G. NORMAN has been appointed manager for the New Ulm, Minn., Telephone Company.

J. M. RICHARDSON has been appointed manager for the Iowa Telephone Company, at Creston.

WILLIAM SHOWERS has been appointed manager of the Grundy Center, Ia., Telephone Company.

H. SOMMERS has been appointed general superintendent for the Rock Mountain Bell, at Butte, Mont.

E. W. WOOD has been appointed manager for the Columbus, Ga., Automatic Telephone Company.

New Construction in the Field

HIGHLAND, CAL.—The Home Telephone Company is to build a line from Highland to Del Rosa.

DOVER, DEL.—The Diamond State Telephone Company has purchased a desirable site in Dover, Del., upon which a modern brick structure will be erected which will be used as the main office for the company's peninsula lines.

ALACHUA, FLA.—The Alachua Telephone Company will soon commence the erection of the poles for a system for the town of Alachua, and will also construct a line to Gainesville and other points.

GOSHEN, ILL.—The Home Telephone Company is installing a new 2,000-line switchboard.

UPPER ALTON, ILL.—The Star Telephone Company has extended its lines to Upper Alton, and will extend them to East Alton.

WOODSTOCK, ILL.—The New Era Telephone Company will extend its lines on the east shore of Twin Lakes. It is said that the construction work will be begun at once.

FAIRFIELD, IA.—The Jefferson County Telephone Company is adding a new switchboard to its exchange in this city and making improvements to its old connections at an expense of $2,000. When the work is completed it will have accommodations for 1,200 instruments.

HAMBURG, IA.—The Mutual Telephone Company is making a number of improvements and building new lines. It expects to have two hundred subscribers by September 1.

BLOOMFIELD, KY.—The telephone lines running from Chaplin to Green's Chapel and Maple Hill has been completed.

BURR OAK, KAN.—The Farmers' Mutual Telephone Company will build a line from Burr Oak to North Branch.

LARNED, KAN.—The Homestead Telephone Company, of Pawnee County, Kan., with head office at Larned, Kan., will construct a telephone system to cover the entire southwest portion of the county. G. W. Roberts, of Ray, Kan., is president.

ALLEGAN, MICH.—The Citizens' Telephone Company is building a copper metalic toll line from Allegan to Martin and intermediate points. A number of cables are being put in here for the improvement and extension of the system.

BIRD ISLAND, MINN.—The Tri-State Telephone Company is building a telephone line from Minneapolis to Ortonville.

FARIBAULT, MINN.—The Tri-State Telephone Company is completing its new system in this city.

LITCHFIELD, MINN.—The Litchfield Telephone Company is installing new aerial cables and making other improvements.

PARIS, MO.—The Mutual Telephone Company will enlarge and improve its exchange facilities.

CHESTER, N. J.—The Chester Telephone Company is extending its line from German Valley to Califon via Middle Valley, Crestmoor and Vernoy.

SOCORRO, N. M.—The Socorro Telephone Company is to build a line from Socorro to Las Vegas.

PORTVILLE, N. Y.—The Inter-Ocean Telephone and Telegraph Company is extending its lines to Allentown.

TRIBES HILL, N. Y.—The Automatic Telephone Company has nearly completed the extension of its line from Amsterdam to Tribes Hill. It is said the line will be extended to Fonda.

BUCYRUS, OHIO.—The Bucyrus Telephone Company is installing a new switchboard. This board will accommodate 960 lines.

MILLERSBURG, OHIO.—The Millersburg, Wooster & Orrville Telephone Company will erect a new three-story building at Millersburg, which will be used for its offices and general supply headquarters.

CLOVER CREEK, PA.—The Morrison's Cove Telephone Company is building a line from Clover Creek in the direction of Henrietta, and will also extend its lines along Hickory Bottom.

DALLAS, TEX.—A new long distance telephone line is being built between Dallas and Fort Worth by the Combination Telephone Company. The company will establish exchanges at towns between the two terminal cities.

HANDLEY, TEX.—The Combination Telephone Company is building a telephone system between Dallas and Fort Worth.

SAN ANTONIO, TEX.—The matter of enlarging the San Antonio Telephone Company in this city will be considered at the coming meeting of the board of directors. D. A. Walker, of Columbus, Ohio, is president of the company.

OGDEN, UTAH.—The Utah Independent Telephone Company is to build a line from Logan to Franklin.

BURLINGTON, VT.—The Northern Telephone Company is extending its lines and improving its service.

KAUKAUNA, WIS.—Work on the new telephone exchange to be installed by the Fox River Valley Telephone Company will be commenced within the next fortnight. At present the company has a crew of men at work on its new exchanges at Green Bay and De Pere.

POMEROY, WASH.—A new telephone line to Alpowa Ridge is being constructed under the direction of C. W. Fitzsimmons.

Book Notices

A MANUAL OF CORPORATE ORGANIZATION. By Thomas Conyngton, New York. Published by the Ronald Press, New York, 1905.

Books equally fitted for lawyer and layman are rare, but Thomas Conyngton of the New York Bar in his "Corporate Organization" has produced a manual that is of peculiar value to legal practitioners and yet can be understood and made use of by business men with ease and great advantage. The work treats the general subject of incorporation from a practical standpoint and is intended to point out the advantages obtainable under the corporate form, and to suggest the ways and means by which these advantages may be most effectually secured. It is not a law book in the strictly technical sense, and does not pretend to give an exhaustive treatment of the legal questions involved. Citations are employed very sparingly, and then only to fortify important points. The last part of the volume contains forms taken from actual practice and covering charters, by-laws, underwriting and voting trust agreements.

The author commences by explaining the corporate system, the ends sought by incorporation and discusses the preliminary questions that arise as to contracts prior to incorporation, where to incorporate and the cost of incorporation. He then treats the basis of capitalization and the division of the capital into shares of stock. Chapters on the charters, by-laws and first meeting of creditors follow.

In the chapter on "Where to Incorporate," the author gives his estimate of various States of the Union as desirable homes for a proposed corporation. Discussing the reputation of different States, he says: "This reputation is of much importance to corporations intending to offer their securities to intelligent investors. In the cheaper localities, on account of this cheapness and the accompanying laxity of the corporate laws."

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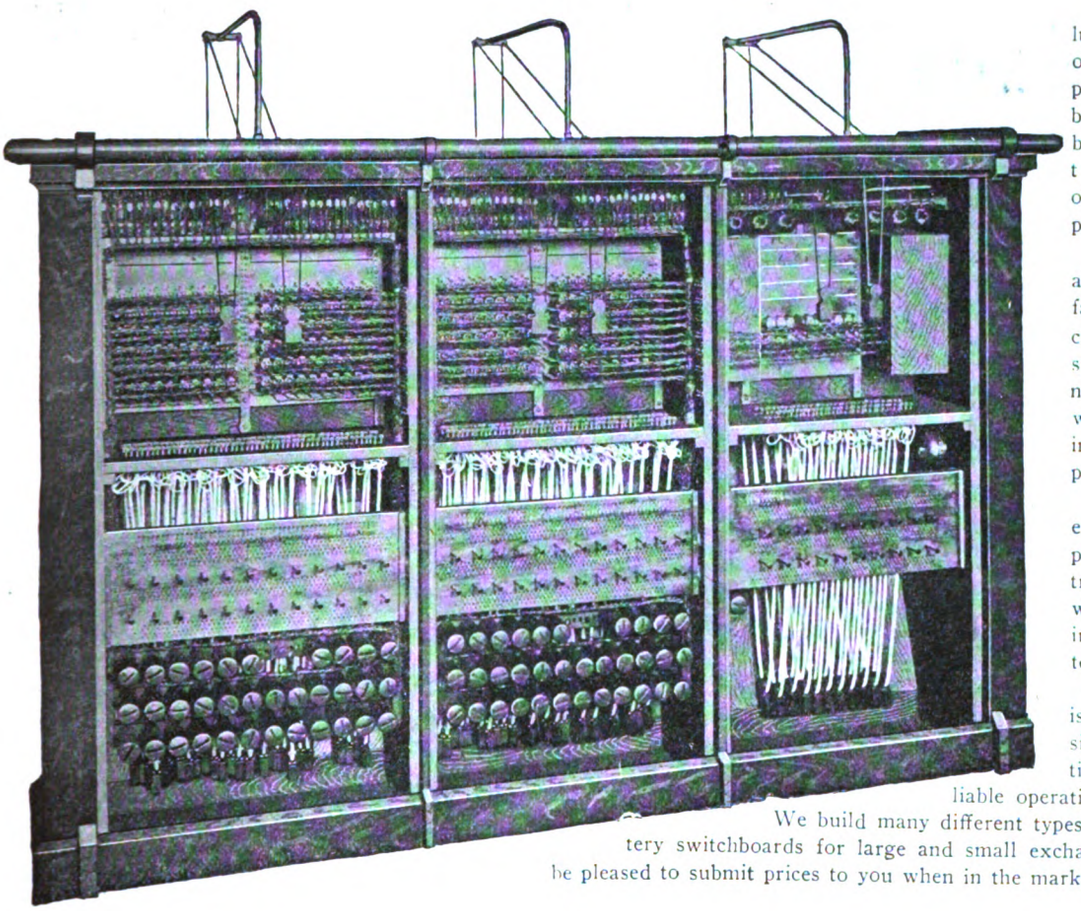
CENTURY
100% GOOD

COMMON BATTERY SWITCHBOARDS



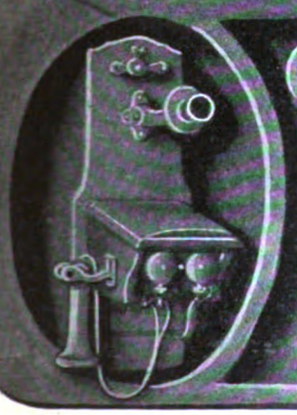
The above cut illustrates the back of one of our three position common battery switchboards, and shows the arrangement of the different parts.

Every piece of apparatus is so fastened that it can be easily inspected, and, if necessary, removed without interfering with any other parts.

In the back of each position is provided a distributing board on which all lines in that position terminate.

All the apparatus is exceedingly simple in construction, assuring reliable operation at all times.

We build many different types of common battery switchboards for large and small exchanges, and would be pleased to submit prices to you when in the market.



CENTURY TELEPHONE CONSTRUCTION CO.
536 ELLICOTT SQUARE
BUFFALO, N.Y.

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MONARCH SWITCHBOARDS

Our study of small exchange requirements has helped us to design magneto boards exceptionally well adapted to the service desired. Our well known methods of honest and careful construction make these boards efficient and substantial.

We are in a position to quote upon and build magneto exchanges of any size and solicit your inquiries.

Our new switchboard catalog is now ready for distribution and will be mailed upon request. The descriptions of MONARCH BOARDS will interest you.

MONARCH TELEPHONE MFG. COMPANY

10-16 So. Clinton St. Chicago, Ills

$4.60 AUTOMATIC vs. $9.40 MANUAL

Our automatic telephone system has been adopted in the following cities:

Chicago, Ill.	Portland, Ore.
Grand Rapids, Mich.	Woodstock, N. B.
Columbus, Ohio.	St. Mary's, Ohio.
Dayton, Ohio.	Westerly, R. I.
Lincoln, Neb.	Manchester, Ia.
Portland, Me.	Princeton, N. J.
Auburn, N. Y.	Albuquerque, N. M.
Lewiston, Me.	Van Wert, Ohio.
Auburn, Me.	Battle Creek, Mich.
Fall River, Mass.	Clayton, Mo.
New Bedford, Mass.	Pentwater, Mich.
Los Angeles, Cal.	Toronto Junction, Can.
San Diego, Cal.	Wilmington, Del.
Hopkinsville, Ky.	Riverside, Cal.
Sioux City, Ia.	Traverse City, Mich.
Cleburne, Tex.	Hastings, Neb.
Columbus, Ga.	Wausau, Wis.
South Bend, Ind.	El Paso, Tex.
Aberdeen, S. D.	Havana, Cuba.
Miamisburg, Ohio.	Marianao, Cuba.
Medford, Wis.	Berlin, Germany.

Operation and Maintenance Expense per 'phone per annum of one of the Telephone Companies that replaced their Manual with our AUTOMATIC SYSTEM. (We will send name of company and detailed statement of above upon request.)

This saving of more than 50 per cent. in Operation and Maintenance cost is pretty strong evidence of the economy of Automatics.

Hand in hand with the decrease in operating expenses goes the increase in quality of service. This latter means more business. All these Automatic advantages combined mean higher values for securities, bigger dividends for the stockholders.

Don't you see that you're wasting money on that out-of-date Manual equipment of yours? If you're a new company, start with Automatic, and start right.

AUTOMATIC ELECTRIC COMPANY

Van Buren and Morgan Sts. CHICAGO, ILL.

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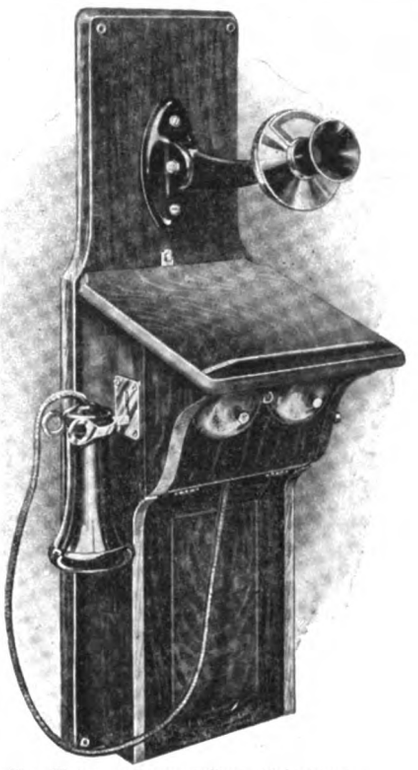
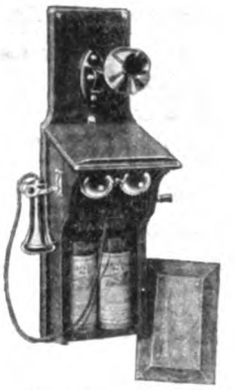
DEAN TELEPHONE APPARATUS

A New Dean Telephone

Upper compartment open, exposing generator, ringer, hook switch, induction coil, arrester and line binding posts.



No. Fourteen-Twenty Type Telephone.



Battery box open. The cover is removed by sliding downward. It is held in place by a spring catch.

Our Number Fourteen-Twenty Type Telephone, shown in the accompanying illustration, is a complete magneto local battery instrument housed in the so-called common battery magneto type cabinet.

The design of this cabinet is along graceful lines, while the finish is exceedingly fine so as to give a most pleasing appearance. The woodwork is of the best seasoned quarter sawed oak or walnut, carefully put together and will thus keep its shape.

The apparatus used in these telephones is of the new Dean design and is interchangeable with that used in our compact type telephones.—A most valuable feature.

These new telephones can be furnished for all classes of special service, such as *ring through, non-interfering, divided circuit, central checking, party line, etc.*

All of our telephone apparatus is fully guaranteed to be free from patent infringement and from all defects in material, design and construction. *This protects you.*

Our folder No. 4 describes the Number Fourteen-Twenty Type Telephone in detail.

THE DEAN ELECTRIC COMPANY
ELYRIA · OHIO

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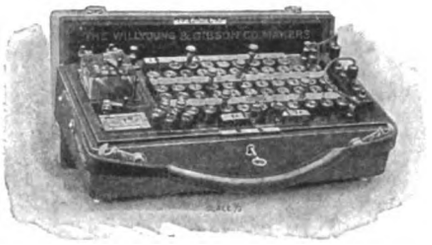
TELEPHONE TROUBLES



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(Circular 500A)

We have a well-organized factory and trained staff whose principal business it is to keep telephone men and telephone systems out of "trouble." We never fail where people are willing to be helped. We help all along the line—our instruments and methods test the copper for conductivity and the sheathing for insulation before the cable leaves the factory; Willyoung instruments test the receiver magnets and coils, the "drop" resistances, the condenser capacities, etc. If anything goes wrong during installation we tell you just where it is; if anything ever gives out on the completed system we tell you where *that* is.

CAN YOU AFFORD TO DO WITHOUT US?

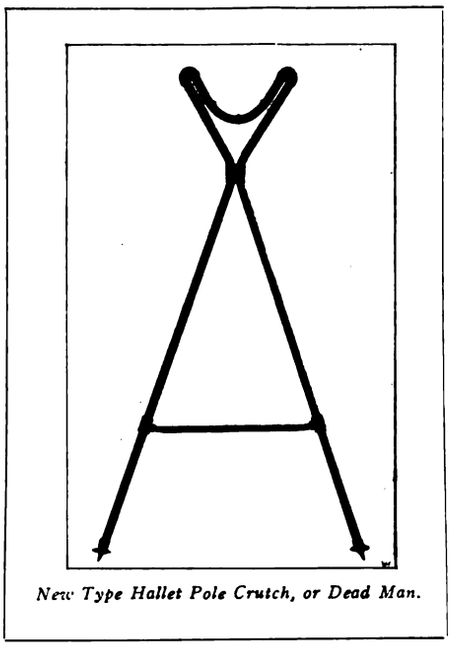
We make Test Sets, Ohmmeters, Fault Locaters of all kinds, Galvanometers, Faradmeters, Electrometers, in short, everything in the Test Instrument Line for either portable or laboratory use; special instruments for any purpose from our own or customer's designs.

Our Catalog Matter is a Liberal Education.

ADDRESS TELEPHONE DEPARTMENT

THE WILLYOUNG & GIBSON CO.

38 West 13th Street, New York City



New Type Hallet Pole Crutch, or Dead Man.

Would you give *a lame old man a* broken stick? Would you put *a ton of timber* on a shaky crutch? Our pole crutch is iron, light and unbreakable.

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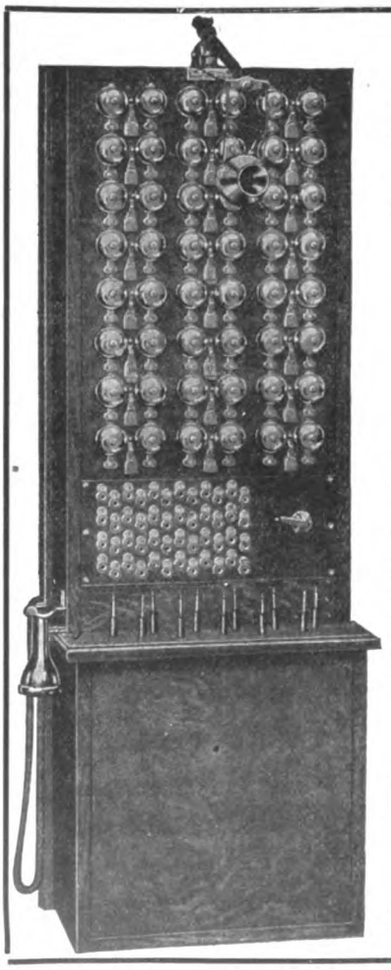

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Strongest Pole Seat Made.

All Iron, adjustable to any Pole.

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AUTOMATIC INTERCOMMUNICATING 'PHONE for EXCHANGE CONNECTION

EXTREMELY SUCCESSFUL SYSTEM.
ABSOLUTELY NON-INTERFERING TRUNK BUTTON.
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SWITCH NOT DEPENDING ON GRAVITY.
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REASON in the world, why you should buy **Roth.**

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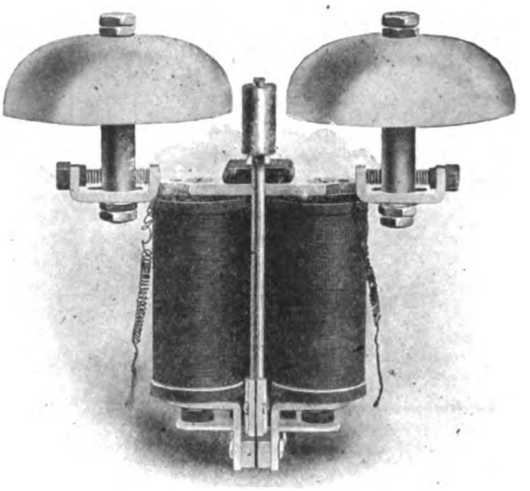

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The external appearance is exactly the same as an ordinary single party ringer.

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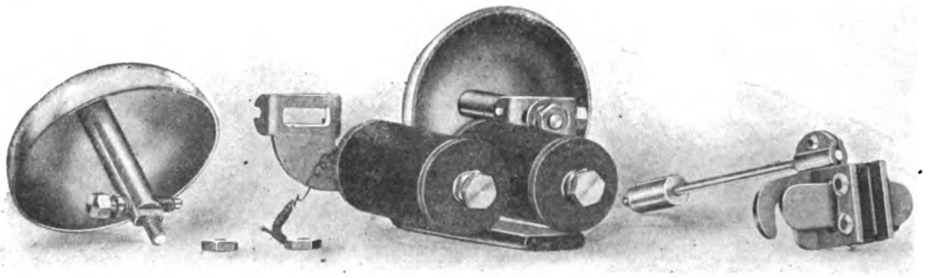
No ground connections are necessary. No springs to get out of adjustment. Each telephone is wired alike. A perfect party line ringer.



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Hook self-contained
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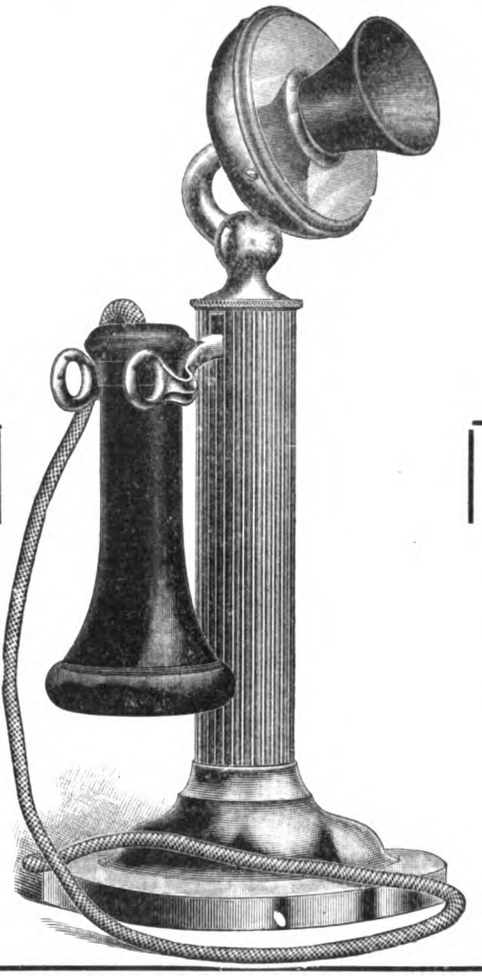
Will not wear off



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THIS RELAY DOES THE WORK

Can call central without ringing other bells on line

Can ring other bells on line without calling central

ERICSSON RURAL LINE RELAYS—For grounded lines

RETARDATION COILS—For metallic lines

SIMPLE—EFFICIENT—EASY TO INSTALL

Let us tell you about them

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296 BROADWAY, NEW YORK CITY

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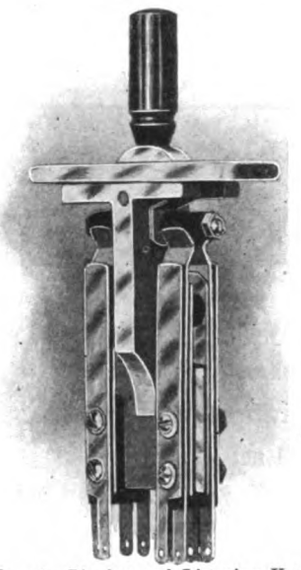
STROMBERG-CARLSON

KEYS

Of course, the successful operation of a board does not depend entirely upon the keys with which it is equipped; nevertheless, we make ours of as good material and test them as carefully as if this were true.



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Pure German Silver Springs

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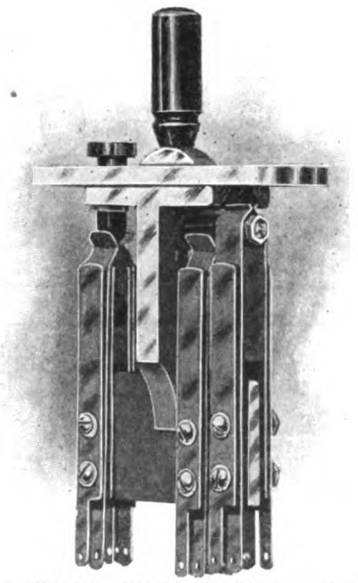

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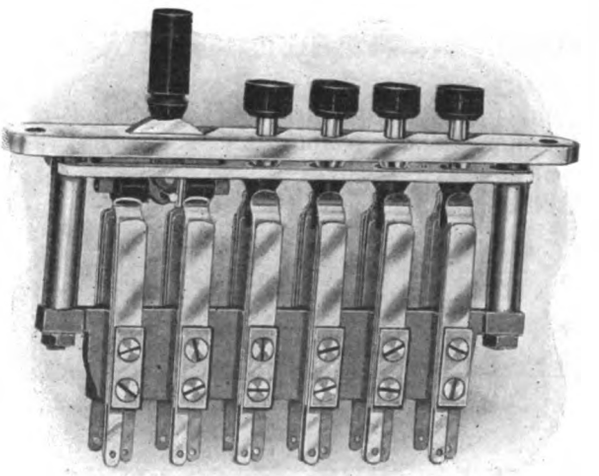

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Our four-party selective indicating key, shown here, has been thoroughly tested by many of the leading Independent telephone companies.

This key only introduces two contacts in the talking circuit—a good point.

We are always glad to mail bulletins or circulars free.

TELEPHONE M'F'G. CO.

ROCHESTER, N.Y. CHICAGO, ILL.

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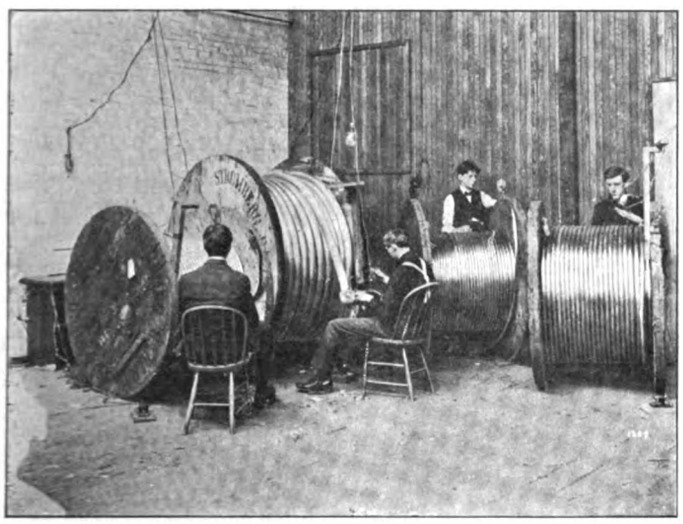
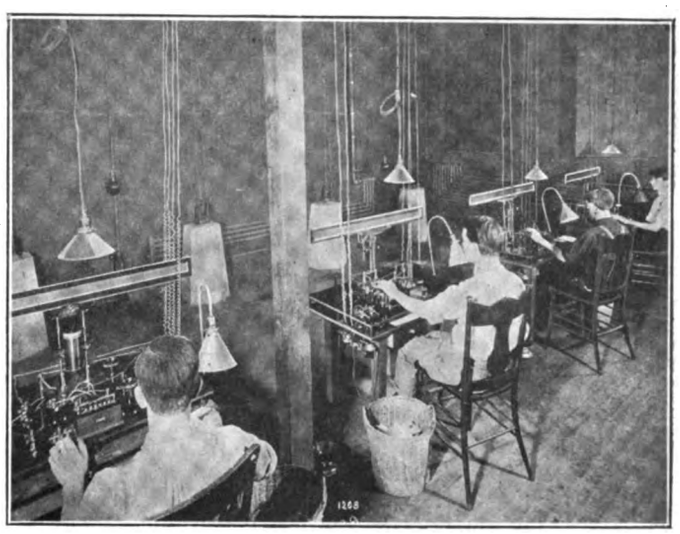
WE MAKE CABLE

FINAL INSPECTION

The last operation through which the cable passes is the final inspection. This consists of an electrical test for insulation and capacity of each individual wire in the cable.





The above illustration shows our method of testing the cables. This is done by experienced men using highly sensitive reflecting galvanometers. All results are obtained by comparison with those of certified standards in the following manner: The deflections are taken from each pair, both for insulation and capacity, and then the deflection from the wires are taken upon the same galvanometers thus giving accurate results.

This is done for each and every piece of cable tested and therefore excludes all danger of the slightest variation which may result from long continued use of any galvanometer.

This method is a variation from the usual manufacturer's test, which is to take deflections of from fifteen to twenty per cent. of the wires, taking three or four wires at once, and thus striking an average of the wires taken. It is readily seen how much more rigid is the test where the deflection is taken on each individual wire in the cable.

This completes the series upon the methods used in the manufacture of modern telephone cable.

Remember two things.

It is the final inspection that counts.

We are always glad to quote prices.

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ROCHESTER., N.Y. CHICAGO., ILL.

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WHY?

Because the cabinets are built by telephone woodwork specialists.

Because every part is machined by long trained machinists, fully tried.

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Makers of First-Award Telephones and Switchboards

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New Model Pay-station
1 to 5 Slot.

EVERY TIME YOU SEE
9/10 REMEMBER 9/10
of the Telephone Companies in United States and Canada who buy Pay-stations

Use Baird's Do You?

If not let us send one on trial

Send for Catalogue and Net Price List—Or still better. Send for a Pay-station on trial

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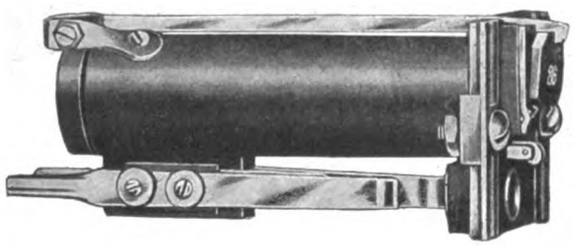
MAKERS OF BAIRD SECRET-SERVICE SYSTEM

SIMPLE
SENSITIVE
EFFICIENT
DURABLE

The FI-NE Tubular Drop



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BE CONVINCED. ORDER ONE

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SOLVED

Cabinet Work the Best, Neatness in Design | Good Generators, " Transmitters, " Receivers | Engineering Ability, Mechanical Skill, Simplicity, Durability = MODEL TELEPHONES

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Send us trial order; the proof will be absolute.
Remember the trial costs you nothing; we pay expenses.
Plant not paying dividends? How queer! Haven't you heard of our selective system?
Only system that selects over unbalanced lines. "Write us for circulars."

It's up to you to investigate
And learn how nicely it will operate;
This selective system a dividend will pay
And keep the trouble man's hair from turning gray.

Address all communications plainly with street and number.

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VOLUME XII *SATURDAY, AUGUST 26, 1905.* *NUMBER 9*

Independent Progress in the State of New Jersey

By Edward A. Tyler.

In the Central and Western States Independent development has been more rapid than in the East. The reason is, firstly, that the Bell did not develop the Central and Western territory to the extent it did the East; and, secondly, because the Eastern States represented the stronghold of the Bell interests. However, here and there Independent companies are scattered through this territory, and in almost every instance, although fighting against great odds, are making sure and steady progress. One such company, which has been beset with more than ordinary difficulties, forms the subject of this article.

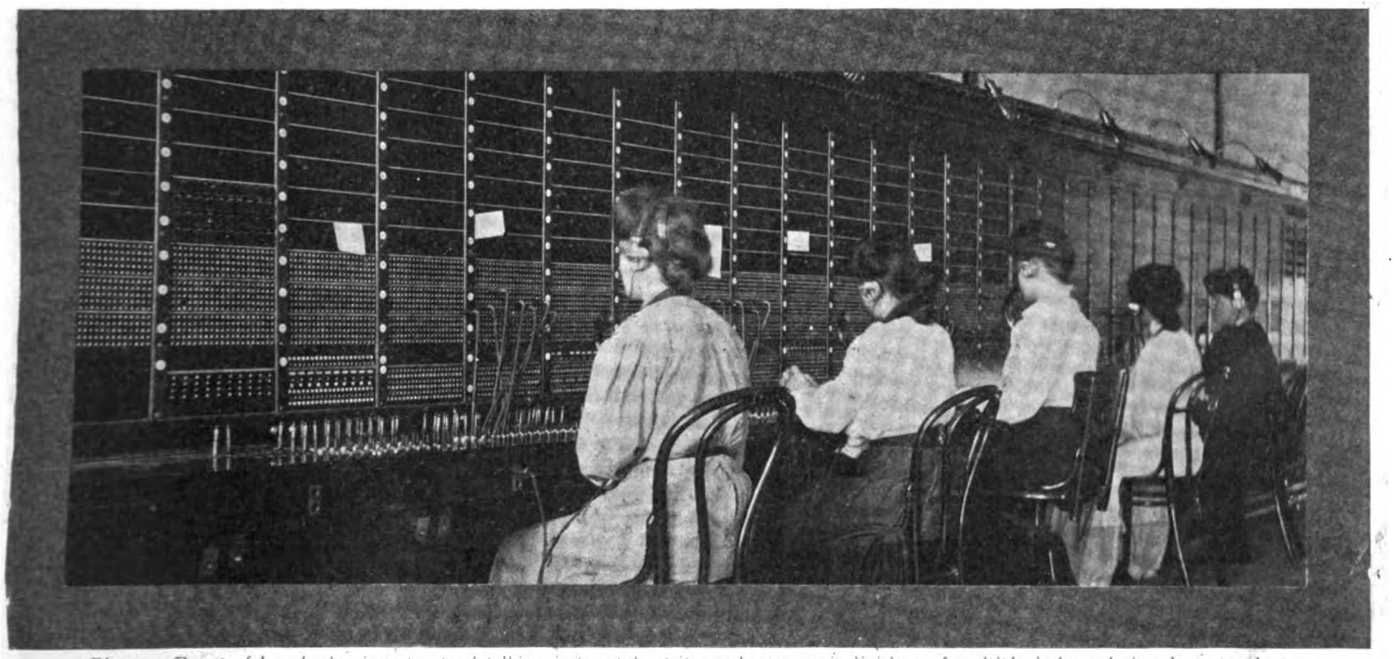

Fig. 1. Front of board, showing operators' talking jacks, style strip numbering, unit divisions of multiple jacks and ring down trunks.

The Paterson, Passaic and Suburban Telephone Company was organized in 1897 as a New Jersey corporation. The capitalization was placed at $300,000. The initial installation consisted of a magneto system and about 200 subscribers with which the company started business. Progress was rapid and by February, 1902, it had upwards of 1,500 subscribers. In that month Paterson was visited with a terrific fire, which wiped out the entire business portion of the city. Millions of dollars' worth of damage resulted, and the entire Independent plant was wiped out. Nothing daunted, the company made immediate arrangements for service, and temporary quarters were established. A switchboard was procured and business started once more. But now the difficulties were increased one hundredfold. Fully 50 per cent. of its subscribers had been burnt out, the city was a physical wreck and for months afterwards business was at a stagnation point. However, Paterson, which in the past had been subjected to similar calamities, immediately commenced to rise, phœnix-like, from its ashes. New buildings were erected and the wheels of business commenced to revolve once more. With the progress of civic improvements the Paterson Independent Company commenced entire reconstruction of its plant. The upper floor of a new fireproof building was leased, and a contract let for a complete central energy equipment. The floor space covered is 75 by 85 feet. This is divided into six rooms as follows: Business office, terminal room, operating room, operator's retiring room, storeroom, battery room and repair shop. The apparatus selected was the American Electric. The ultimate capacity of the board will be 5,000 metallic circuits. At the present the equipment installed is for 2,000 lines, of which 1,000 are working. The front and rear views of the board are shown in Figs. 1 and 2. Attention is drawn in Fig. 2 to the multiple cable run and to the arrangement of the cord relays and terminals. Space has not been sacrificed and consequently the maintenance of the circuits is made much easier by the roomy arrangement of the various parts. The cabinet of the board is mahogany and makes a very handsome appearance. Each cord circuit is equipped with selective ringing keys, besides the usual accompaniment of supervisory signals.

Operators' breast plate transmitters are employed, which greatly add to the speed of operation, as by their use it is not necessary for an operator to handle her transmitter at all in reaching to jacks beyond her immediate position. Duplicate operators' telephone jacks are provided so that beginners can listen in and learn the routine of the business.

The chief operator's desk, which is shown in Fig. 5 is supplied with the usual circuit arrangement for supervision and additional apparatus, consisting of a strip of pilot lamps, which indicate to

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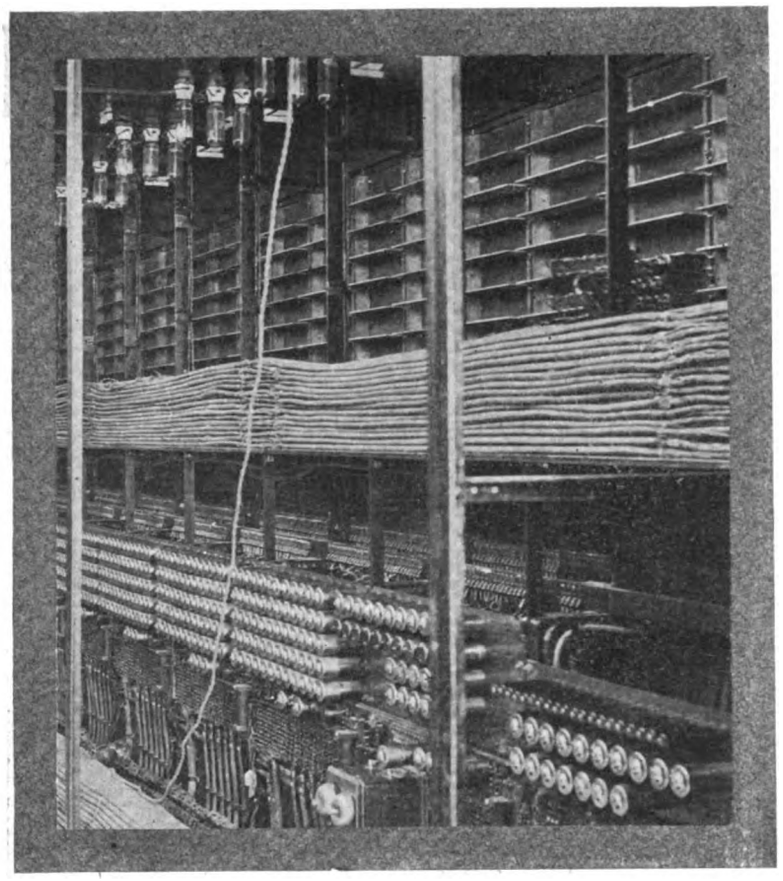
Fig. 2. *Rear of board, showing multiple cable run, supervisory relays, cable terminals and cord shelf.*



her when operators are listening in on subscribers' connection. This is an entirely new departure in supervision and greatly adds to the effectiveness of the circuits by keeping a close watch on the operators' movements.

In the terminal room are the main and intermediate frames, relay rack for line and cut-off relays, power equipment and power boards and wire chief's desk. A view, showing the rear of the main distributing frame and the front of the relay rack, is shown in Fig. 4. The relay rack employed is of the standard American Electric pattern, the cable and switchboard terminals being mounted alternately in vertical rows, the cross section between the cable and switchboard terminals being made across the rear of the board through the rings shown in the illustration. In the arrangement of the vertical strips a novel idea is employed. The first right-hand strip is used for cable terminals and is numbered 1; the next strip is the terminal for the multiple cables and is numbered 0 in conformity with the general practice employed in multiple jacks by designating the first hundred as 0, the second hundred as 1, the third hundred as 2 and so on. The third terminal strip then would be numbered 2 for the cables and the fourth terminal strip numbered 1 for the multiple lines and so on down the length of the main frame.

The power equipment consist of two Holtzer-Cabot motor generators of 7½ horse-power each. The motor side is wound for 220 volts and the generator side for 40 volts. The ringing machines also consist of two Holtzer-Cabot generators. One is wound to take 220 volts. The two have additional windings which furnish the high and low frequency currents for selective signaling. On the shaft of each generator are howler attachments. The other machine is specially designed to operate from the storage batteries in case of emergency. The battery consists of type F chloride accumulators in glass jars. Their capacity is approximately 72 ampere hours. The power panel shown in illustration (Fig. 4) is equipped with a full complement of switches, volt and ammeters and an overload and unload circuit breaker. The base is slate and the whole device is mounted on a rigid iron framework. To the right of the power board is an auxiliary fuse panel for the relay board and lamp circuits. This also is mounted on a slate base. The interesting feature of this exchange is the testing frame illustrated in Fig. 6, upon which all instruments to be tested are erected before being installed. The instruments slide into the framework in a similar manner to that employed in placing the rear doors of the switchboard cabinet in position. The terminals consist of three German silver springs, which furnish solid contact with the instrument terminals. This method of making connections does away with the necessity of attaching wires to the binding posts and is much more rapid.

The cable equipment consists of three hundred pair units for the underground distribution. To these, small multiple cables are connected, which extend in all directions. At present six 300-pair cables enter the exchange, although provision is made for twenty-four. Six multiple direct conduits are employed for the underground runs exclusively. The cables enter the building through the basement and are brought up on the outside through a specially constructed brick cable way. They are then led under the floor to the base of the main distributing frame, where a triple joint is made with a lead sleeve for each cable respectively, and 100-pair cables run up to the rear of the vertical terminals.

The wire chief's test table is shown in Fig. 4 at the rear of the power and fuse panels. Every device for the rapid testing of lines and location of faults is proved, and the cabinet contains besides, pigeon holes and drawers for records and card indices of lines and cables. This board is finished in mahogany to match the main switch-

Fig. 3. *Power panel with controlling switches on the left, fuse board for circuit protection on the right, wire chief's desk in the background.*

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board and chief operator's desk. On the right of the terminal room is the battery room and repair shop. The batteries are mounted in two tiers within an airtight cabinet provided with removable glass panel doors. The cells are contained within heavy glass jars. Directly in front of the battery cabinet is a long bench upon which all instrument repairs are made. All necessary tools are furnished which are kept in racks or lockers.

In the store room all supplies are kept for interior and exterior installation, such as fuses, wire, arresters, brackets, insulators, porcelain and rubber tubes for bushings, etc. The operators' retiring room is supplied with easy chairs and all other conveniences for the operators' comfort when off duty. At present there are ten employed, but this number will be increased as the business grows. The manager's office is a large room in the front of the building facing on Market street. Besides the usual routine business all contracts are handled from this office as well as the details for all special installations. One feature of the arrangement of the various departments which is worth mentioning is the relation they bear to each other in order to save time. The entrance from the wire chief's room to the operating room is midway the rear of the main switchboard. By this arrangement no time is lost in getting to the switchboard for repairs, as is often the case when the distance between the board and the terminal room is of any length. Then the battery is conveniently located in case of trouble. The instrument test rack is mounted at the rear of the intermediate frame in the terminal room. This is an especially good location as it enables the wire chief to know definitely by hearing the signals, whether the bells are adjusted correctly or not.

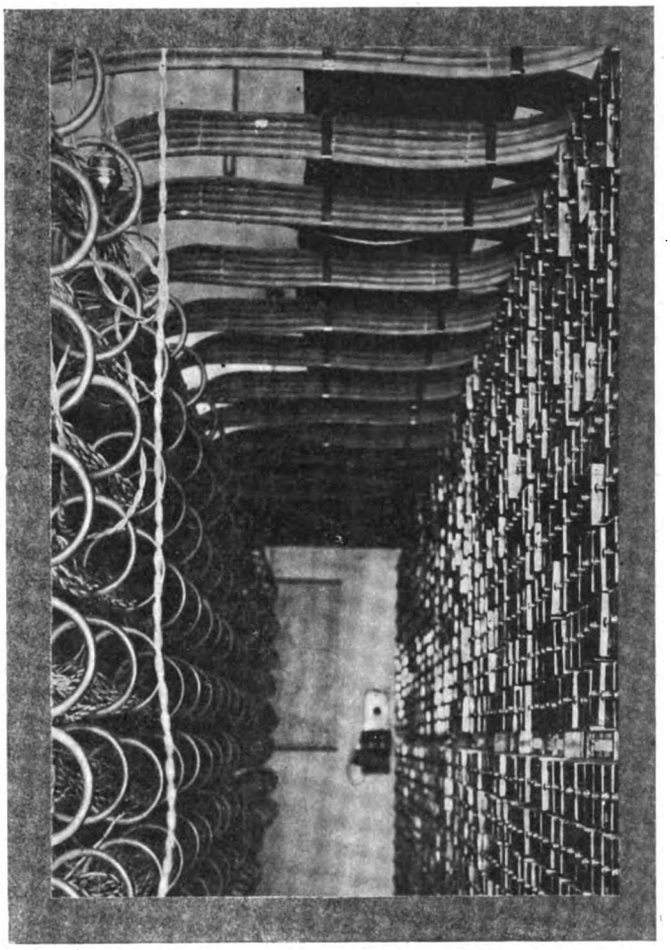

Fig. 4. Rear of main distributing frame, showing distributing ring and front of relay rack.

The type of desk stand employed is unique in that the base and standard are enameled in black. This presents a very neat appearance and is not subject to discoloration occurring where nickel stands are employed.

The lighting of the various rooms is well nigh perfect, large double windows being provided at the front and rear. There is no crowding of the apparatus to save space, in fact provision is made for full extensions to the ultimate capacity of 5,000 lines.

The cut over took place on April 1st with satisfactory results. Since then the business has been growing rapidly, new contracts being constantly received, with several on the waiting list for terminal facilities. When it is considered that the big fire destroyed the entire heart of the city, and that for fully a year afterwards the debris was being removed to enable new buildings to be erected, it will be readily understod that the results obtained by this company in getting into business again, reflect great credit upon its officials.

The officers are H. R. Swartz, president; Wayne Dumont, counsel; Geo. A. Post, vice-president; Barker Gummere, Jr., treasurer; F. A. Demarest, general superintendent, and J. W. Lindsay, secretary and general manager. This company also operates in Passaic.

Fig. 5. Chief operator's desk. This desk is equipped with supervisory signals to indicate when operators are listening in.

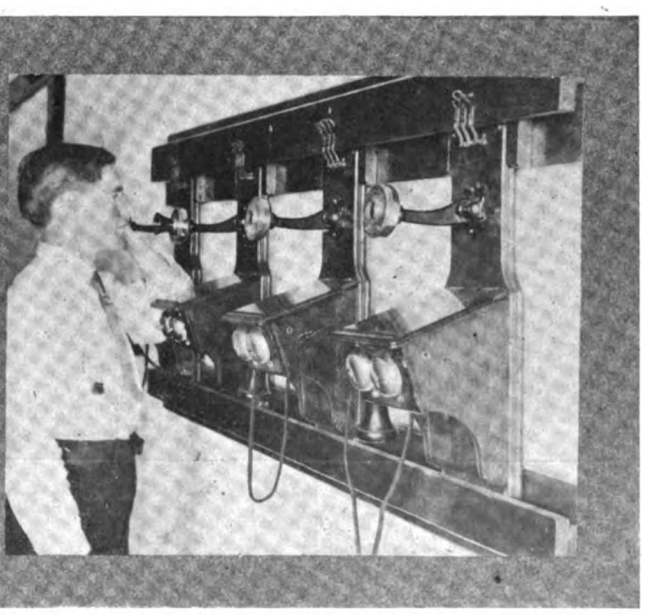

Fig. 6. Special test board arranged to simultaneously test four instruments for selective signaling.

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The Phenomena of Lightning—Article II—Protection

By Newton Harrison.

A TELEPHONE system consists in general of two parts: The lines or conductors and the delicate transmitting and receiving devices. Injury is sustained by these on the least provocation. The necessity for intelligent protection is a foregone conclusion. It is best obtained by a complete system of well-grounded lightning arresters, whose most important feature is an air gap connecting to the earth and adjusted to discharge or neutralize a static charge as rapidly as it is manifested. With

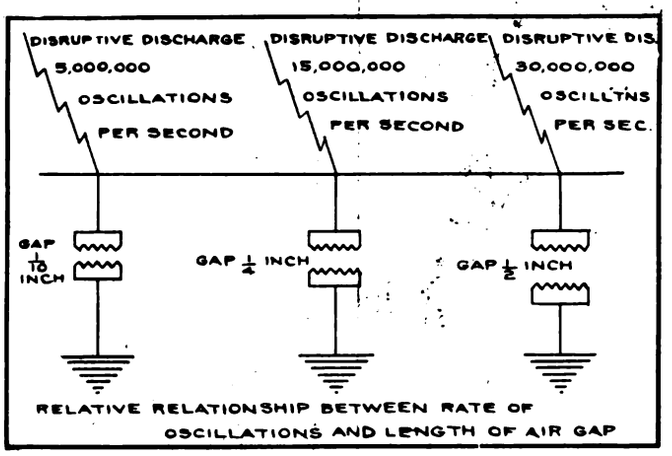

Fig. 4. Effects of varying air gaps upon varying rates of oscillation.

reference to this, it may be stated that electrostatic disturbances arise from sudden meteorological or atmospheric changes, disturbances which affect telephone apparatus readily and whose removal is accelerated by an arrester with a small gap.

The varying rates of oscillation of lightning discharges are dependent upon the resistance, capacity and inductance of the paths offered. The potential, however, is secondarily the controlling factor with regard to the actual sparking distance. Arresters with air gaps may be set for higher or lower potentials.

The air gaps are best understood, as far as their functions are concerned, with respect to the oscillatory nature of the disruptive discharge and the distance which offers the least opposition. By this is meant that a high rate of oscillation in contradistinction to a low rate of oscillation, will be the prevailing influence in leading a charge over a large air gap. In other words, air gaps that are leaped over, by oscillating charges, are simply instances of where the electricity finds it a better path than a solid conductor. The line is such a conductor, and the charge, which can only travel along its surface at the best, will readily pass through an arrester with an appropriate air gap in preference to continuing to force its way through the wire. The facts, with respect to this state of affairs, are therefore best represented by the sketch in Fig. 4, in which it is shown that a high rate of oscillation can leap a greater gap than a lower rate. Other conditions may temporarily interfere with this result, but it is so largely a question of the influence of the disruption or impact of a charge upon the line or from the line that this relationship can be depended upon as fundamental. In speaking of the

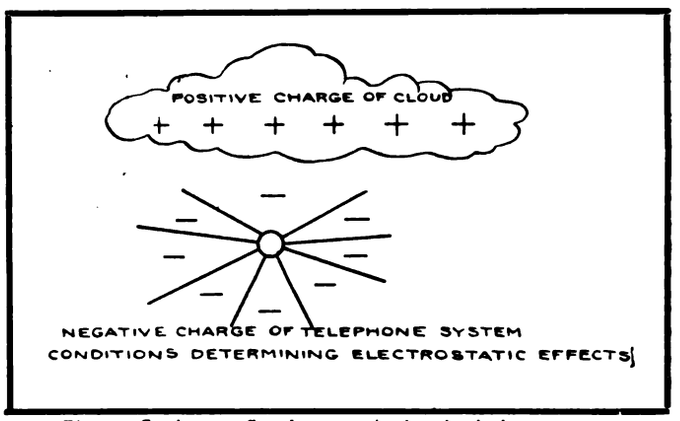

Fig. 5. Condenser effect between cloud and telephone system.

charge leaving the line, the presumption is that the electro static induction betwen the cloud and the telephone system has caused a condenser effect between the two, as shown in Fig. 5.

The further hypothesis is that the cloud is of a very high potential and can therefore induce a potential in every body within its influence. The higher this body, or the nearer it is to the cloud, the more reason to believe that this will determine the point of discharge. This is particularly so if other points of discharges possess in their circuits higher reactances. The whole question, therefore, of electrical protection in this respect, for telephone systems, is that of providing a good electrical path to the earth. It is practically the equivalent of a safety valve, by means of which an excess of electrical pressure is released, without injurious demonstrations. In a negatively charged telephone line, like Fig. 7, the charge in the line is of a higher potential than that of the earth. If means of relief are provided, so that any undue rise in this respect empties itself through the medium of the arrester, it is quite evident that a continuous adjustment would then take place between the earth and line

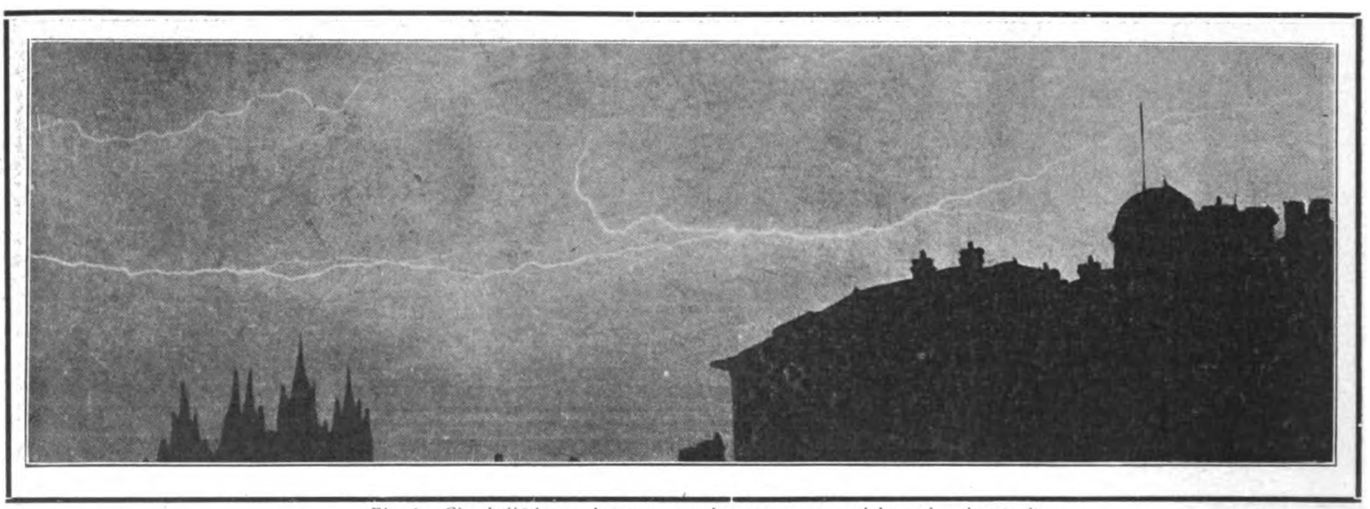

Fig. 6. Cloud discharge due to a rise in pressure caused by reduced capacity.

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potential. If a good arrester can execute this release, it would be almost impossible, except in extraordinary cases, for an over rise of pressure to take place in the telephone circuits. The idea is, therefore, to allow the static pressure to leak away, as quickly as it rises to a dangerous point. This can occur without flash or report, in the same way that a static charge will leak away from any source, if provided with adequate facilities. The curious character of some discharges can only be explained on the basis of the conducting paths and air gaps in its way.

In the photograph, Fig. 6, the discharge curves away from itself and streams in various directions. This streaming effect which in this case is not dangerous, because it occurs between cloud and cloud, is caused by the sudden rise of potential due to the changes in the cloud formation. If a certain mass of vapor contains a certain charge of electricity, the reduction of its bulk would mean an increase in the potential of the cloud mass. The electricity becomes concentrated, or to use a better word, condensed, and this leads to a brilliant and apparently continuous series of flashes across the sky. If, however, the charge is heavy, and the cloud low upon the earth, the induction resulting may lead to the forms of destruction so much to be feared in telephone systems.

As the result of experiments conducted for the purpose of ascertaining the pressure required to cause a disruptive or miniature lightning discharge between two metallic balls .4 inch in diameter the following table is appended:

Volts required for discharge.	Distance in inches of discharge.
4,765	.04
8,140	.08
11,307	.12
14.119	.16
16,664	.20
19,210	.24
21,823	.28
26,255	.44
28,949	.60
30,133	.72
31,494	.88

In telephone systems the amount of protection secured by means of arresters is dependent upon their durability, the character of the moving parts, if any, and the amount of inspection and further adjustment possible. Considering the fact that discharges between the earth and clouds are of frequent occurrence during the summer season, the line requires protection from static outbursts every few hundred feet. Arresters employed in this manner are in the end cheaper than line or exchange repairs and interrupted service. The erraticism of lightning can be partly explained by its seeking for a path of low reactance. It will apparently dodge and dart from spot to spot, but examination of the conditions, if fully understood, would disclose the fact that the oscillations and inductance are the controlling influences. Because of the possibility of the discharge repeating its performance in or about the same place, moving parts in arresters are apt to render them useless for continued action.

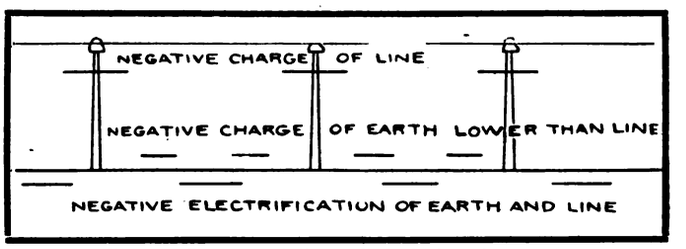

Fig. 7. Pressure of line a little higher than earth.

More absolute protection for telephone lines, and in fact for all lines, could be secured by the erection of higher poles than those employed for the line itself. The principle already outlined, that induction between static charges develops its highest potential between the nearest points, would meet with its most consistent application in this respect. Instead of expecting the lightning to strike the telephone lines it would be better to make such provision that lightning is more apt to strike what might be well called guard lines and poles. A series of high poles with a dummy wire stretched between, also provided with arresters, would more effectively solve so great a problem than the present system in vogue. If expenditure means telephone service then its wisest form is that which protects a system. From this standpoint lightning protection is fully as important as the installation of new apparatus or the further development of telephony along the latest lines laid down by science.

(*Concluded.*)

The Railway Telephone Service; Cost of Line Construction*

By Frank F. Fowle.

THE ownership and operation of private telephone lines by railway companies is a proposition which differs essentially from the public exchange and toll business. There are three distinct differences which place the railway telephone service in a separate class, namely:—the service is not operated for direct revenue, it is only an auxiliary in the railway business and the nature of the traffic permits discriminations and very quick service. Since the telephone is a competitor with the railway telegraph and the railway mail, the economy of the telephone is interwoven with the cost of the telegraph and the mail. It is generally true of the traffic of communication that the volume of traffic decreases with the length of haul and that the bulk of the traffic is short haul.

The whole question of telephone service and its economy is secondary to the traffic, and the use of the telephone is justified when the traffic can be handled as cheaply in no other way, and when the nature of the existing wire plant is such, that to neglect the possibilities of simultaneous use is a waste. The traffic of communication, by telegraph and mail, should be thoroughly studied before it is decided whether the cost of telephone line construction is justified. The very short haul traffic is almost invariably handled most economically by telephone; the rapid increase in the use of private branch exchanges bears out this view. The inherent advantages of the telephone in this field are quick service and immediate answer or response; and in the class of communications of which no record is made these advantages are paramount.

Undoubtedly the mail, the telegraph and the telephone are of relatively different economy under different conditions, but there is a class for each in which its economy makes it the superior method. It is important to keep records of the traffic of communication by these three methods, in order to see that each is handling the business which it is adapted to handle most cheaply.

The railway mail probably constitutes the cheapest means of communication and its peculiar field is not likely to be invaded until the advent of the printing telegraph. The natural tendency is to abandon the mail for the telegraph and the telephone, on account of the quicker service, and one of the uses of traffic records is to detect and prevent such abuses, when the speed of the mail service is amply efficient. However, the mail service can never be better than the train service, and this point seemingly constitutes its limitation.

The entire traffic of communication is generally divisible into three main parts;—the local or short haul, the traffic over each division or the moderate haul, and the traffic between the

*Paper read before Association of Railway Telegraph Superintendents at Chattanooga, Tenn., May 17, 1905. Copyright 1905 by Frank F. Fowle.

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division offices and the main offices or the long haul. The volume of the long haul traffic depends very largely on the organization of the various departments, the distribution of the organization over the road and the territory covered. The organization of the telegraph department will naturally be one conforming to the particular requirements of any case. There are two common features in nearly all organizations, namely:—one train dispatching wire and one message wire, cut into all offices, over each division; if the division is long and the business heavy, it may be subdivided because one wire cannot handle the traffic. The long haul traffic between division headquarters and the principal offices is usualyl handled on wires cut into few offices, and not infrequently these wires are duplexed or quadruplexed. The cost of telegraph service rests on considerations which are quite apart from those which determine the cost of telephone service. Before discussing the question of cost it may be well to define it, as considered in this paper.

What Constitutes Cost.

Cost may be divided into two parts, operating cost and cost of ownership. Operating cost includes labor, power, light, heat, rent, and such supplies as are used in daily operation and not chargeable to plant maintenance. The cost of ownership includes the fixed charges on the entire plant, interest on first cost, depreciation, maintenance, insurance and taxes; it is customary to compute these charges on a yearly basis and give to their sum the term Total Annual Charge.

The total yearly cost of ownership and operation is the sum of the Total Annual Charge and the Total Annual Operating Cost. This cost covers the entire plant, both line and terminals. There is obviously a division of cost between line and terminals which results in the best economy; this division of cost may vary with the traffic conditions to be met, and the best economy will then be obtained by dividing the cost between line and terminals under conditions which satisfy the greater proportion of the traffic.

The Cost of Line Construction.

All discussions of the comparative cost of construction are beset with the difficulty that the market prices of material and labor are constantly fluctuating. The average market price seems to be the only basis for comparisons which may be broadly useful; and that is the basis here used. The average price is further a safe basis in forming conclusions as to what proportion of future facilities should be included in the initial installation. As to this matter, it seems unwise to plan into the future further than the life of the vital portion of the plant—for obvious reasons.

Following a study of the expected traffic comes the question of how much will the line cost for a given volume (or loudness) of transmission. This question, like most others, is one of increasing cost with increasing efficiency; or in other words—for a given length of line, the louder the transmission desired, the more will it cost. Much has been said about standards of transmission, but the choice of a standard is a matter to be determined by the interests constructing the line and paying for the service. The engineer is concerned with this question only to show the *relation* between the volume of transmission and the cost.

Standards of transmission are usually defined as those over uniform circuits of particular construction, with only a standard telephone at either end. It is then possible, knowing the equivalents of cables and apparatus in terms of the standard circuit, to design transmission circuits to meet almost any commercial condition. Standards are very frequently stated in terms of open wire circuits of No. 8 B. W. G., and of cable circuits of No. 19 B. & S. G. The open wire lines are strung with the wires 12 inches apart; increasing the separation improves the transmission very slightly. The cable circuits are insulated with paper; increasing the capacity diminishes the efficiency. The K. R. law of transmission in cables is a simple and useful one; if R is the metallic-circuit or loop resistance per mile and K is the capacity between the two wires per mile, the talking efficiency is inversely proportional to the square root of the product K. R. For example, to double the capacity and halve the resistance does not alter the efficiency. This law is inapplicable to open wire circuits.

High efficiency in open wire lines is secured by using low resistance wires; high efficiency in cable lines is secured by using low resistance wires and adopting a construction which will give the least capacity. The following table shows the weight of one wire per mile, for open wire circuits to talk various distances, on the assumption of several different standards.

Copper Wire.

Distance in Miles.	Weight per mile, for a standard of No. 8. B. W. G. of 850 Miles.	1200 Miles.	1800 Miles.
100 miles			
200 "			
300 "	115 lbs.		
400 "	175 "	105 lbs.	
500 "	230 "	150 "	
600 "	290 "	190 "	110 lbs.
700 "	350 "	230 "	135 "
800 "	410 "	270 "	165 "
900 "	470 "	310 "	190 "
1000 "	530 "	350 "	215 "
1200 "	650 "	435 "	270 "
1400 "	780 "	520 "	325 "
1600 "	910 "	610 "	380 "
1800 "		695 "	435 "
2000 "		785 "	490 "

Iron Wire, BB Grade.

100 miles	180 lbs.		
150 "	450 "	210 lbs.	
200 "	750 "	400 "	160 lbs.
250 "		610 "	270 "
300 "			400 "

The cost of construction may be computed on the basis of 15 cents per pound for copper and 3½ cents for iron, and on the assumption that pin space is available on existing pole lines. There is also a charge against the circuit for its proportion of the original cost of right-of-way and the cost of poles, cross-arms, miscellaneous material and labor; but this charge is practically independent of the questions at issue and may be omitted from comparisons.

The cost of circuits in cable is determined by the prices of copper, lead and tin and by the method of construction adopted. The great advantage of the paper-insulated cable is the fact that its low capacity makes it very much less expensive than other types. Comparing rubber with paper on the basis that the rubber cable has about three times the capacity of the paper cable, the rubber cable will require more than three times as much copper as the paper cable—because the capacity increases with larger conductors; and rubber insulation is more expensive than paper. Paper insulation is undoubtedly the most economical for underground and permanent aerial work; rubber cable is justified only when its exposure is such that its superior insulating qualities are necessary and the extra cost may be regarded as insurance against service interruptions. Rubber insulation is superior for emergency cables and is often preferred for short submarine crossings. Paper cables are enclosed in lead sheaths to exclude all moisture and keep the paper perfectly dry. There is little advantage in sheathing rubber cables unless the thickness of rubber insulation is small and the cables are for submarine use. Aerial or underground rubber cables are usually covered with a layer of jute and then a braided covering.

(*To be continued.*)

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The Organization of a Telephone System

By H. P. Story.

THE long felt necessity in business, especially among large concerns, of having the outline of their organization distinctly defined has at last been supplied in the form of a diagram of organization. This device outlines the functions of the various departments, shows the relation of one to another.

The general manager by the use of such a chart handles his business and moves his forces in the same manner that a general in the army conducts a campaign. Although a business man or the executive of a corporation may have from long experience a general knowledge of his organization and in some cases allow his subordinates to work along the line of the old adage that "water will find its own level," the head of one department, while knowing his own duties and the duties of those under him, may be at a loss to understand how far his authority extends and the possible relation of his to other departments.

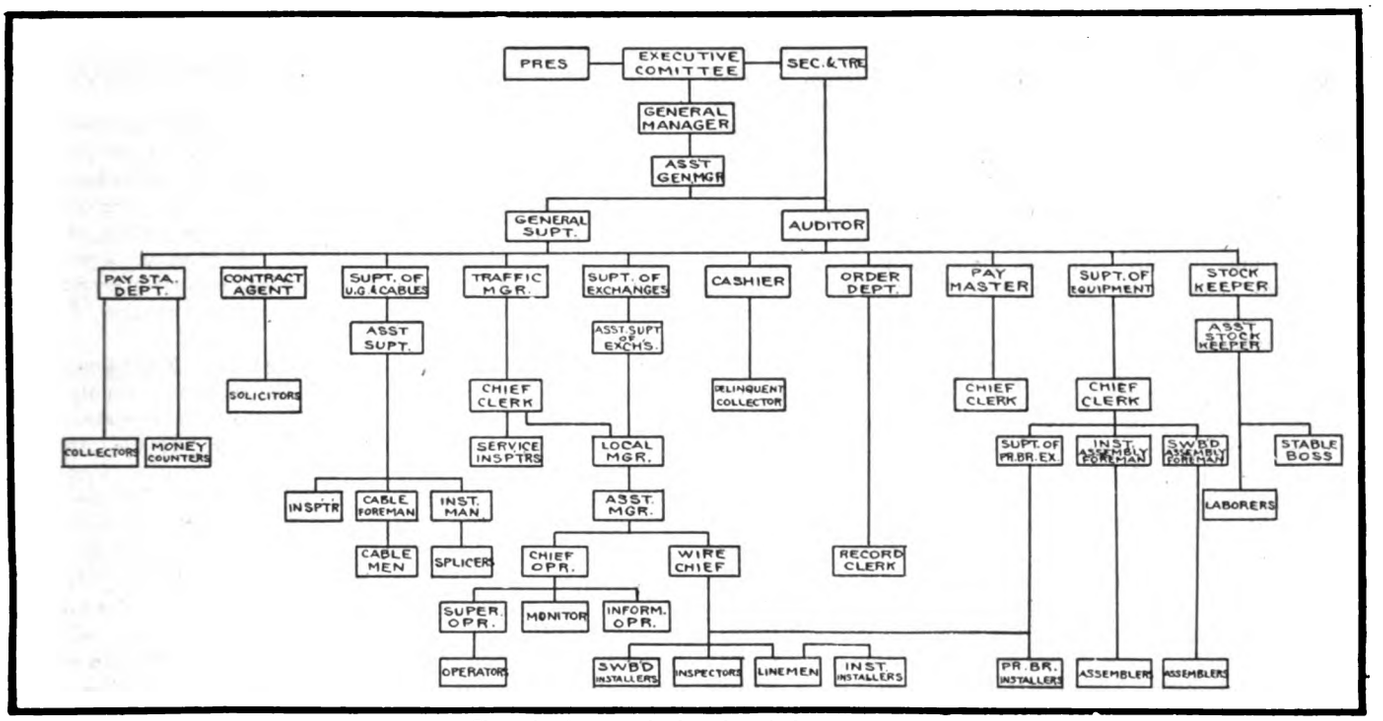

Chart showing organization of a telephone company.

The value of the organization chart is appreciated by the employee as well as by his superior, as by its use he feels that not only will his errors be traced directly to him, but that he will be given credit for his good work. It is therefore an added incentive for good work. Any employee will work more intelligently and with greater satisfaction to his employer if he is familiar with the machine of which he is a part.

A diagram of organization is of especial value to a telephone company, with its various exchanges, its hosts of employees and its complex system of departments. The accompanying diagram shows a practical organization for a telephone company. Any error which may occur can be traced to a definite point in the organization. If a lineman pulls a drop to the wrong side of a house or an installer leaves his work in an unsatisfactory condition, it is the duty of the wire chief to see that the error is rectified. It is the duty of the local manager, to whom the wire chief is directly responsible, to see that he has the change made, and this course continues up through the assistant superintendent of exchanges and the superintendent of exchanges, who is directly under the supervision of the general superintendent.

Referring to this chart, the field of influence of every employee is shown ranging from the president down to the laborers as follows:

The executive committee receives reports from the president, secretary, treasurer and general manager. The general manager is directly responsible for the work of the assistant general manager. The latter official oversees the work of the general superintendent and has joint supervision with the secretary and treasurer through the auditor's department of the expense accounts. The general superintendents has direct charge of all other departments from the standpoint of maintenance and operation. The duties of the auditor are entirely financial. All bills and expenses and salary accounts pass through this office to be verified before being submitted to the assistant general manager for his O. K.

The pay station department attends to the collection and counting of money from that source. New business is acquired through the contract department. All cable work is in charge of a superintendent under whom the men are graded according to responsibility. The traffic manager supervises the service and through his chief clerk holds joint supervision with the superintendent of exchanges over the local managers and the maintenance and operation of the different exchanges. The superintendent of exchanges has direct charge of their maintenance and operation from the mechanical and electrical standpoints. The cashier's department pays and receives moneys from all sources and has direct charge of delinquent accounts.

All orders for new work, changes, etc., are handled through the order department, which makes out the necessary records. The pay roll is in charge of the paymaster, whose duty it is to compute the wages of each employee from the daily time slips or cards. New equipments of all descriptions are supervised by the superintendent of equipment. New work on private lines and branch exchanges is in his charge and for this purpose he can call upon the wire chief for such additional help as he needs for installations of such character. The stock keeper has direct charge of all stock, and besides looks after stables, wagons, horses, drivers, and laborers not specifically charged to other departments.

The organization chart is not a distinct novelty, and although it has not come into general use, its value is being more and more appreciated each year.

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THE EDITOR'S PAGE

ORGANIZING THE WORKING FORCES.

THE larger a telephone system the greater the number of its employees. The organization of this working force to meet the requirements of practice, constitutes one of the severest experiences of exchange managers.

Roughly speaking, attention is drawn to two great divisions of labor, the men outside and the men inside. In both fields of activity sub-classifications of work take place, according to the particular department of effort required. Specialization resulted from the origination of certain kinds of skill, and in consequence the question of organization became a matter of the most vital importance. Of the benefits of efficient organization it is hardly necessary to expatiate. The saving of money and time are naturally the most prominent factors appearing. But beneath these self-evident advantages lie other considerations, which ultimately become of equal if not of greater importance than the former two. One of the first to attract attention is the grading of men according to their skill and capabilities. This fact in itself is one of the most stimulating influences to the ambitious worker.

The possibility of being moved up, if worthy of advancement, has been the means of telephone companies having, as it were, on tap a certain number of eligible employees to high positions. Between the lowest and the highest exist the various planes of skill and responsibility in the executive, operative, repair, constructive and clerical departments. Essentially, as is fundamentally obvious, a telephone system is a business proposition. It can only exist by the profits it makes These profits come from the pockets of the general public, and it would require no argument to show that the failure of the first to supply a ready and efficient service would result in the second, namely the public, refusing its support or patronage. For this reason the grading of workers to produce the best possible effects as regards time and expense is an imperative necessity. The very existence of the exchange and its patronage depend upon it. And the extent to which this organization is carried out in detail, to facilitate the trasmission of messages, the repairs of the plant, and, if neccessary, its further extension to meet growing demands, is the only logical reason for financial success.

If favoritism to certain employees is not shown, and advances are made on the basis of actual worth, a spirit of interest will develop which will result in ideal co-operation. Listlessness or indifference are by far worse than stupid perseverence.

The organization of the working forces of a large operating company is wonderfully assisted by the removal of the lazy and unfit.

PROTECTING TELEPHONE SYSTEMS.

A FEW words would not be out of place, at this season of the year, in regard to the protection of telephone systems, from the blighting effects of lightning. The development of that enormous force in nature's laboratory has led to many discussions as to its origin; but with the exception of Benjamin Franklin's experiment and a few tragedies resulting from the efforts of careless or unfortunate experimenters, all we know is, that it consists of a powerful static discharge. It may stretch across the heavens a distance of a mile or more, or it may appear as a blinding spear of light between the earth and sky. But the practical problem, arising in the minds of those entrusted with the care of telephone systems, is that of preventing accidents or injury to the installation, both with regard to the lines and devices, as well as the operating force. Personal protection is of more actual consequence than even the dollars and cents question involved in the case of the plant. Where such lines, as those required for use in rocky districts, stretch over peculiarly affected areas, ample protection is secured by means of two methods of procedure. The first relates to the arrester, the test it will successfully sustain under artificial conditions. The second relates to the kind of ground made between the arrester terminal and the earth.

The ground is of immense importance in actual practice, and for the reason that if the geological formation is of such a character that a thick rock bottom exists under the earth bed, it is imperative to find a stream to which contact from the arrester is made. This is because the earth contributes its portion of electricity, in cases of lightning discharge. If the earth cannot find relief from the widespread stress, lightning arresters are valueless. They are the outlet between the two accumulated charges of overhead clouds and the underlying earth.

As far as the arresters are concerned, it is a foregone conclusion that scientific construction is the thing that counts here. The air gap must mean relief, when charges accumulate in the telephone lines, due to an overhead charge. If the arresters cannot discharge, when tested with a high tension source of current, they are defective. The best protection in one sense therefore is confidence in the device installed, if such confidence is based upon ocular demonstration. The cost of arresters, even when used lavishly, as compared with the heavy expense caused by destructive discharges, is in some respects the same as a comparison of the cost of steam cocks and gauges with the expense of an exploding boiler. If the injury to the system were all, and no loss of business or inconvenience were otherwise considered, the repairs would ultimately wipe away all traces of trouble; but the difficulty lies deeper than this. A telephone system is very badly off if its protection in this respect is not complete enough. A failure to operate, due to this state of affairs, cannot be too severely condemned.

CONDUIT SYSTEMS AND THEIR DANGERS.

INTERRUPTIONS to telephone service are one of the greatest annoyances business men have to experience. The development of the present conduit system is partly responsible for this state of affairs. The placing of wires underground involves grave risks of the following character: the water straining into the earth from a variety of directions may collect and injure the operation of the system, through lack of sufficient drainage; or the neighboring gas mains may leave a highly explosive mixture in the manholes, capable of great injury to the worker and cables alike. Cement coatings for manholes may remedy this to some extent. On the other hand, the constant inspection of the covers will catch leaks through their edges and give ample opportunity for renewing the gaskets before the manhole is flooded. The great danger, as already stated, is that of permitting water or gas once to enter. Getting them out completely is an herculean task. There are instances of manhole covers taking aerial trips, with passers by in the neighborhood. For such occurrences as these there is little or any excuse, except under special circumstances. As a rule, the telephone companies have to pay the piper if any one is injured, for the blame will rest on their shoulders almost inevitably.

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The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

NORTH CAROLINA RAILROAD COMMISSION.

What are the powers of the North Carolina Railroad Commission, and has the statute establishing it ever been declared unconstitutional?
G. R. C.

IN North Carolina the power of the Board of Railroad Commission is limited to fixing rates. The statute establishing it, which is Chapter 320 of the Acts of 1891 of North Carolina, has been declared constitutional. Railroad Commission v. Telephone Company, 113 N. C., 213.

TAXATION OF PATENT RIGHTS.

How is capital invested in patent rights taxable, by the State or United States authority? P. N. L.

CAPITAL invested in patent rights is not subject to state or local taxation, and there is no federal statute imposing taxes upon such capital. People v. Campbell, 138 N. Y., 543, 34 N. E., 370.

BOOKS ON ELECTRIC LAW.

I have been very much interested in your papers, "The Telephone in the Courts," and in connection therewith I am asking you to recommend to me some good books on telephone and electrical law, one that would aid in the framing of franchise, etc. Please advise where the books could be purchased. C. W. S.

THE latest text book on electrical law is "Joyce," published by the Banks Law Publishing Company, 21 Murray street, New York. It is not exactly what you wish, but may be of assistance to you.

FIGHT AGAINST HOME TELEPHONE COMPANY.

A TEMPORARY injunction has been granted against Sol. P. Kineon and the Home Telephone Company to prevent the erection of poles and lines in Newport, Ky. The City Attorney brought the proceedings, alleging that the company was about to erect poles and string wires without authority and that it would be a difficult matter to secure any revenue from the business for the city if this was allowed. This is a continuation of the fight against Kineon, who is endeavoring to secure an entrance into Cincinnati for his line, which now covers considerable territory in Kentucky.

SEEKS RESTORATION OF OLD FRANCHISE RIGHTS.

THE Denver Telephone & Telegraph Company has brought a suit in the U. S. District Court which revives years of litigation as to the legality of the franchises held by the Colorado Telephone & Telegraph Company. The present suit is brought by the Denver company as the successor of the Rocky Mountain Telephone & Telegraph Company, in an effort to have the action of the city council of 1901, which repealed the franchises of the plaintiff, reversed. The telephone company asks the district court to declare null and void the action of the city council in repealing a resolution granting a perpetual telephone franchise to certain prominent Denver men who later sold the right to the Denver company. An order restraining the city from interfering with the continuance of the work of installing the system is also prayed for.

Charges of conspiracy between the Colorado Telephone Company and members of the Denver board of public works and city council are freely made, the same charges that were made in previous suits already won in the courts by the Denver company. The Denver company immediately after securing the franchise installed a central exchange with 1,000 instruments and laid a mile of wire in underground conduits, when the board of public works refused to issue a permit to continue the work. The Denver company fought the works board through the district and supreme courts and won. However, when the company attempted to continue its work the council repealed the resolution granting the franchise.

Allegations are made that the Colorado Telephone Company furnished the money for the board of public works to fight the previous cases through the courts, and also that the Colorado company contributed different amounts to the Republican campaign fund, one of the amounts being as much as $5,000. Under the terms of the franchise to the Independent company the city is to have its telephones free. Other advantages not now extended were also to be enjoyed.

INCORPORATING A PARTNERSHIP.

THIRTY-SIX citizens of Fleming County, Ky., desiring to incorporate themselves into a telephone company and build and operate a telephone line between Mt. Carmel and Flemingsburg, subscribed various sums from twenty-five dollars to five dollars each for the capital stock of the corporation, afterwards to be organized. Before the articles of incorporation were prepared, they obtained a right of way along the turn pike between the two towns, purchased and erected poles thereon and sufficient wire and insulators to complete that part of the proposed line. They then appointed a special committee of nine to prepare articles, but the committee was unable to agree and four refused to go on with the organization and reported back to the subscribers, who agreed with the minority of the committee. The remaining five became incorporated as the "Mt. Carmel Telephone Company." The other thirty-one subscribers incorporated with the name of the "Mt. Carmel & Flemingsburg Telephone Company." The five subscribers, who had first incorporated, brought suit against the thirty-one subescribers who subsequently incorporated, to recover possession of the personal property originally acquired by the thirty-six.

The court stated that the subscribers for the stock of a proposed corporation, before it is incorporated, are partners in the business which they have in hand. The court held that the committee of five was merely the agent of the subscribers, and hence, when the articles prepared by the five were repudiated by the subscribers, the five were not authorized to proceed and bind the remaining subscribers by their incorporation proceedings. The title to the property was determined to be in the defendant corporation, which was the one organized by the thirty-one subscribers. Mt. Carmel Telephone Company v. Mt. Carmel & Flemingsburg Telephone Company, 84 S. W. 515.

DEFENSE IN TAX SUITS.

AFFIDAVITS of defense were filed in two actions brought by boroughs against telephone companies to collect taxes. The Central District & Printing Telephone Company answers the borough of Oakmont, denying liability. It is said that an ordinance is to provide revenue by taxation for general expenses of the borough and the license fees are not based on the cost and expense the borough is put to. It is alleged if other municipalities charged the same licenses, the tax for the defendant's system would be $125,000 annually. The Allegheny Telephone Company answered the borough of Braddock, making similar denials to the first part of the Central Company's answer.

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IN THE OPERATING FIELD.

ORGANIZATION OF IOWA CLEARING HOUSE COMPLETED.

THE final arrangements for the organization of the Iowa Independent Telephone Clearing House were completed at a meeting of representatives of companies throughout the state held recently at Boone.

The purpose of this new organization is to check the toll messages and apportion the amount of the total earnings which pass over two or more toll lines. The association will have the same powers over the toll business of the companies interested as the Western Passenger association has over the mileage of the Western railroads. The headquarters of the association will be in Des Moines, it being centrally located and easily reached by the members and officers.

Meetings will be held at the call of the president, C. C. Deering, and a number will in all probability be held in the near future or until the company has been given a good start.

The officers of the company follow: President, C. C. Deering, Boone; vice-president, P. C. Holdoegel, Rockwell City; secretary and treasurer, J. M. Plaister, Fort Dodge. The three officers mentioned above, together with E. H. Martin, of Webster City, and Charles E. Cockerill, of Sioux City, will constitute the board of directors.

Among those who attended the meeting were the following: W. G. Bowe, Marshaltown; E. H. Martin, Webster City; U. S. Alderman, Nevada; F. M. Boardman, Nevada; C. A. Peterson, Manchester; S. S. Lichty, Waterloo; W. J. Phill, Dyersville; Charles G. Cockerill, Sioux City; H. A. Douglass, Cedar Rapids; J. F. Glenn, Denison; H. A. Kinney, Woodbine; M. A. Reed, Woodbine; P. C. Holdoegel, Rockville City; J. M. Plaister, Fort Dodge; J. C. Thorne, Fairfield; Dr. Nelson, Dayton; Charles C. Deering, Boone.

WINONA, MINN., PROTESTS AGAINST INSTALLATION OF BELL INSTRUMENTS IN CITY OFFICES.

BUSINESS men of Winona, Minn. have filed a protest with the city council against a petition made by the Northwestern Telephone Company (Bell) for the free installation of a number of telephones in the city offices. The protest is made on account of the Bell company cutting rates and giving free service in order to cripple the local Independent company. In concluding the parties signing the argument state that in their judgment the Bell petition should be refused until it places its business on a legitimate basis as other corporations and business men engaged in legitimate competition do. Also that the city council is justified in refusing to install in public offices Bell telephone service at any price, or to do anything that will in any way tend to aid it, in its effort to compel the local company to do business at a loss.

LARGE EXPENDITURES MADE FOR IMPROVEMENTS IN INDIANA DURING THE PAST YEAR.

A VERY large amount of money has been spent during the past year by the various Indiana Independent companies.

A few instances of the improvements that have been and are being made are the following: At Shelbyville, the entire plant is being rebuilt and a new system is being installed. At Crawfordsville a great deal of cable has been laid and many other improvements made, whereas none have been made by the Central Union in that city. At Columbus an average of fifty additional telephones per month are being installed. At North Vernon where there are now more than three hundred telephones, $15,000 is being expended in the rebuilding of the plant and improvement of lines. At Kokomo nearly 300 new applications for telephones have been filed and the capacity of the plant will have to be enlarged to accommodate these. The New Long Distance Telephone Company has installed new circuits to Franklin, Greenwood and Veedersburg and two new circuits from Indianapolis to Bedford. The Lafayette company is expending about $75,000 on improvements.

PLAN TO REDUCE NUMBER OF UNNECESSARY CALLS.

A PLAN to cut down the number of unnecessary calls has been originated by Arthur Kneisel, manager of the Eastern New York Telephone and Telegraph Company at Hoosick Falls. Gummed labels similar to the figure are pasted across the top of all subscribers' instruments. Very little opposition is met with from the subscribers, as they are given the benefit of all revenue derived from the telephone, and are only required to pay the regular monthly rental. Many subscribers are anxious to have the "stickers" to protect them from their friendly (?) neighbors.

ALL NON-SUBSCRIBERS OF THIS COMPANY MUST PAY FIVE CENTS PER CALL FOR THE USE OF THIS TELEPHONE.

EASTERN NEW YORK TELEPHONE AND TELEGRAPH COMPANY.

The company points out that if a non-subscriber does not have sufficient use for a telephone to warrant his paying for it, he should at least be willing to help some one pay who does, and that if a call is not worth five cents to him, it is not the kind of a call the company cares to handle.

Further than this, the company believes when a non-subscriber finds he has to pay for service, he will prefer to have one installed for his own use.

NEW INDEPENDENT SYSTEM FOR HATTIESBURG, MISSISSIPPI.

THE City Council of Hattiesburg, Mississippi, has granted a twenty-five-year franchise for an Independent system to to W. H. and S. A. Jones and Geo. D. Winter, of Chicago. The proposed rates for the first year are: Business, thirty dollars per annum; residence, direct wire, eighteen dollars; and residence, party lines, twelve dollars. When six hundred subscribers have been secured an increase of six dollars is to be made on all the above rates. These rates are to be maintained till two thousand subscribers have been secured, when they may be again advanced to an equitable amount.

There is a provision in the franchise forfeiting all rights in event of transfer of stock to a competing company; or sale in any way which will cause the company to be operated in the interest of a competitor. The owners of the franchise further obligate themselves to enter into no agreement or combination to raise or maintain rates. If anything of this character should

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follow, the mayor is empowered to declare the rights forfeited and cause the plant and equipment to be confiscated.

The franchise must be accepted within thirty days from the date it becomes operative.

BELL USES GUISE OF MUTUAL COMPANY TO ENTER MACY, IND.

AT Macy, Miami County, Ind., where a good Independent telephone exchange has been in operation for two years, a so-called "mutual" telephone company recently asked for a franchise, refusing, however, to name rates or state its officers. The franchise being refused, it proceeded to put up its lines without it. The workmen were then arrested. It is stated that the new company, known as the "Mutual," is backed by the Bell Company, which tried to get subscribers to start a system one year ago, but was not successful. It has become pretty well understood that whenever a so-called "mutual" company asks for a franchise to compete with an established Independent telephone company and refuses to submit to reasonable municipal regulations, regarding rates, etc., that the Bell Company is behind the deal somewhere. It is only recently that the Bell people has evinced any love for the farmer. When it had a monopoly, there were no farm telephones in Indiana. At the present time there are upwards of 30,000 farm telephones connected with Independent systems in the state.

LONG DISTANCE IMPROVEMENTS UNDER CONSIDERATION IN KENTUCKY.

AN important meeting of Independent telephone men was held in Lexington, Ky., recently, for the purpose of considering an extension of the long distance lines and a renewal of contracts with the Independent Long Distance Telephone Company.

It was decided to construct a new copper circuit from Lexington to Louisville and to make other improvements in the lines.

Plans were also considered for making Lexington the center of all the long distance lines of Central Kentucky.

Among those who attended were Col. Joshua Powers, president of the United States Trust Company, of Louisville; J. A. Armstrong, president of the Independent Long Distance Telephone Company; E. L. Barber, of Ohio; Buckner Woodford, William Wyall and J. A. Humbert, of Paris; George A. Straus, of Carlisle; W. A. Chambers, of Winchester, and George S. Shanklin, L. G. Cox and Desha Breckinridge, of Lexington.

INDEPENDENT COMPANY AT LE MARS, IOWA, IN FLOURISHING CONDITION.

IN fulfillment of its plans for a wider range of business a special meeting of the stockholders of the Le Mars Telephone Company was recently held at which practically all of the common stock was represented. It was unanimously voted to amend articles one and six of incorporation to increase the capital stock to $100,000, and to change the name of the company to the Plymouth County Telephone Company.

Besides furnishing rural service for Plymouth County, it has toll lines to Sioux City, which will be completed about September first, and which will give connection with 2,000 telephones in that city. The Le Mars company has 1,000 telephones in Plymouth County.

Two No. 10 copper wire circuits are under construction to Sioux City, Cherokee, Storm Lake, Fort Dodge, Webster City, Boone and Des Moines and intermediate points, and other lines will be constructed as necessary to keep up with the growing demand for Independent toll connections.

ROME, N. Y., INDEPENDENT SYSTEM SOLD TO INDEPENDENT SECURITIES COMPANY.

ANOTHER link in the proposed Independent telephone line from Buffalo to New York has been obtained by the Independent Telephone Securities Company through the purchase of the Rome Independent Telephone Company. The Rome exchange has 1,300 telephones in service. The purchase price of the Rome company is said to have been $150,000.

The property in addition to the Rome exchange includes about sixty miles of toll lines. This purchase will give a continuous Independent telephone line from Syracuse to Little Falls and Oneida.

THE CITIZENS OF PORTLAND VOTE IN FAVOR OF INDEPENDENT COMPANY.

AT the recent municipal election in Portland, Ore., it was decided to test the public feeling in respect to an Independent franchise. The result proved that Portland differed in no way from any other city which has experienced the Bell yoke by a vote of 13,194 for and 566 against. Evidently the people are not averse to the dual system idea.

The same is also true of San Francisco in spite of the statement frequently made by the Pacific States Company, that it would never meet with competition in that city, and that local capital could never be interested in the installation of a competitive system. The service of the Bell Company in San Francisco has been very unsatisfactory, and in consequence the people are rapidly making contracts with the new company.

THE TELEPHONE EMPLOYED AS AN AID TO FISHING.

AN English paper reports that a Norwegian has invented a telephone, by which the noise made by fish in the depths of the sea can be heard. The instrument consists of a microphone in a hermetically sealed steel box. It is connected with a telephone on shipboard by electric wires, each sound in the water being intensified by the microphone. The inventor asserts that with its aid the presence of fish, and approximately their number and kind, can be recognized. When herrings or smaller fish are encountered in large numbers, they make a whistling noise, and the sound made by codfish is more like howling. If they come near the submarine telephone their motion can be distinguished. The flow of water through the gills produces a noise similar to the labored breathing of a quadruped, and the motion of the fins produces a dull rolling sound.

UNITED TELEPHONE COMPANY OF INDIANA RAISES RATES.

THE ultimate results of the sale of the United Telephone Company of Indiana to the Bell are now being made evident. The Markle Telephone Company, which was a part of the United property, has raised its rates and a similar increase is expected in other towns having United service.

WANTED—IDEAS

THE results of the call for contributions which has been appearing on the operating field pages for the past two months has been most gratifying. We believed that there were numbers of our readers who had good ideas and only required the suggestion to make them public. Still there are many things being done in secret as it were, which we are certain are of enough importance to become public. These are what we wish to hear about and what our readers wish to know as well. If you have an idea, no matter how simple, it undoubtedly has some value. Send it to our editorial department. Its only necessary qualification is that it must apply to telephone operation. Fiction or poetry is unavailable. Accepted articles will be paid for the 10th of the month following publication.

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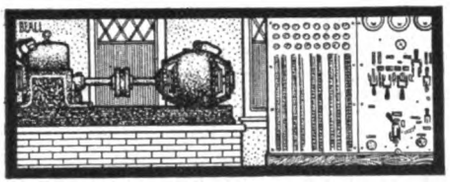
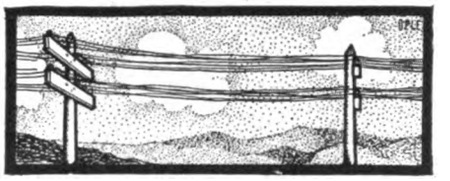


QUERIES

Questions on any subject relating to telephony will be answered on this page.



TO ELMINATE CROSS TALK.—(592.)

We have a toll line 14 miles north; 10 miles from Mt. Lake we have bridged a line to it east 4 miles. These lines are of No. 12BB wire. Then again we have No. 10BB wire line on same poles to a number of farmers, about 14 miles. Each line is tied to the outside pin of a 4 pin cross arm, and are both grounded. The toll line has four and the farmer line 16 telephones bridged to it. We find that the lines cross-talk so much that we can hear the parties talk on the other line, as if the wire were crossed. Would not like to make these lines both metallic, if there is another remedy. How would it work if we made it common return? The circuits are shown in Fig. 592. F. H. T.

The use of a common return will lessen the cross talk, but not entirely remove it. The cheapest immediate remedy is to string

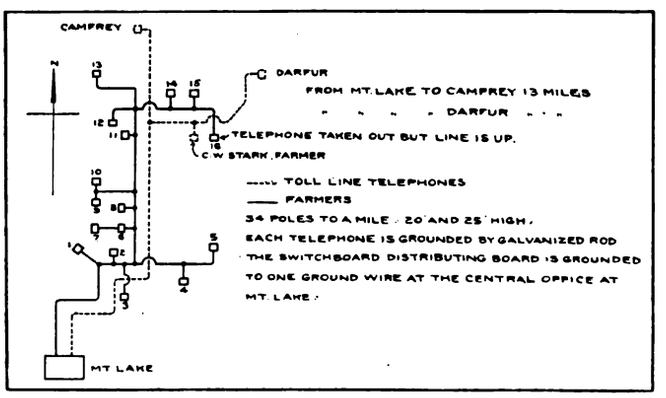


Fig. 592.

another No. 12 B B wire, making the toll line metallic. Transpose the toll line every quarter mile. This will eliminate the cross talk between your lines at an expense no greater than that of a common return and with much better results. The cheapest transposition is the "single-pin" style. This type of transposition can readily be shifted a few poles without cutting the wires, in case the location is not the proper one initially.

CROSS TALK ON TOLL LINES.—(593.)

We are troubled with cross talk upon our toll lines and don't know how to correctly transpose. The conditions are as shown in the sketch, Fig 593a. We have three exchanges, as shown. The trunk d terminates in a cut in jack at E and out again as d^1. If any through trunk between either E, and E^2, or E^2 and E^3 is busy, and we plug up either d and g or d^1 and g together, to complete a through circuit, the lines are noisy. Trunks extend from E^1, E^2 and E^3 to other points not on our system. Can you tell us the right transposition scheme and what point we should start from. F. E. T.

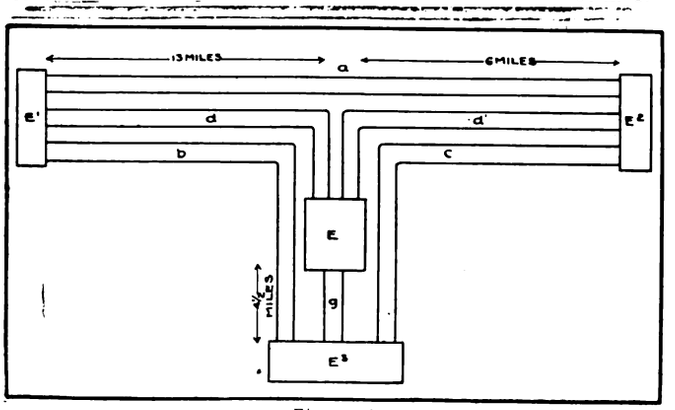


Fig. 593A.

Your question is indefinite in that you have not shown a pole diagram giving the positions of the circuits and the distance between them. The following layout will be satisfactory on the assumption that the three circuits are on a six-pin cross-arm.

Fig. 593B shows a two-mile section, with transpositions.

The two-mile section goes exactly into the six miles from E to E^2. A special three-mile section is necessary between E^1 and E and a two and one-half mile section between E and E^2; these two special sections are necessary because the distances are not exact multiples of the two-mile section.

These special sections are obtained by extending or shortening the standard section, as may be necessary. Fig. 593C shows the completely transposed lines.

PRIVATE BRANCH EXCHANGE.—(594.)

In installing a private branch exchange, which type is preferable, lamp or drop signal? What should be the size of the cable conductors to supply battery current? Are condensers necessary at the branch exchange end of the battery trunk? P. L.

For small installations a drop or visual signal of high resistance is preferable. If lamps are used there will be a heavy drain upon the battery current which will not only cause the lamps to burn dim if more than two or three are lit at the same time, but if several connections are up, the amount of available current for talking purposes will be so diminished that transmission will be imperfect and cross talk would probably result. Visual

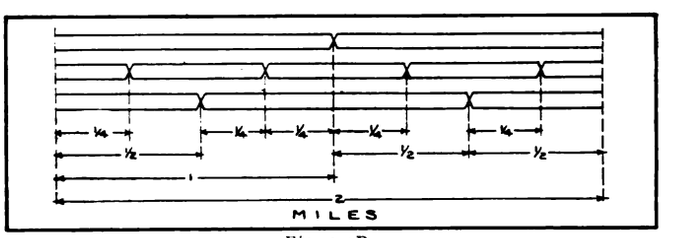


Fig. 593B.

signals of high resistance prevent waste of current and consequently there is a greater available amount for talking purposes. The cable conductors should not be less than No. 19. If these have not been provided in the cable, two pairs of No. 22 should be employed, in which case the line sides of each pair should be joined together for one side of the circuit and their mates for the other. Condensers are bridged across the terminals of

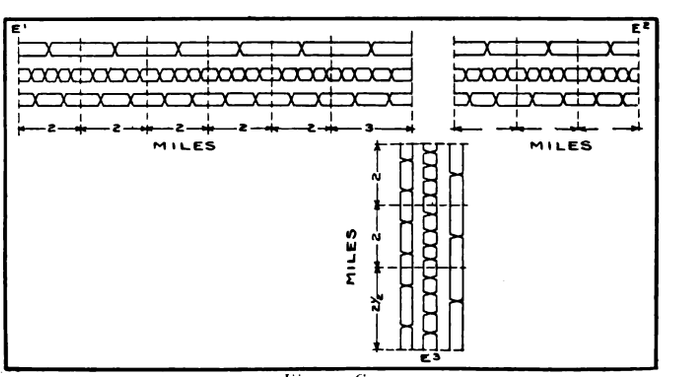


Fig. 593C.

battery trunks at branch exchange boards to prevent cross talk. If the trunk is of any length the drop in potential across the exchange terminals due to its resistance would be considerable. The condensers bridged across the terminals absorb the fluctuations of the battery current and thus prevent this trouble. It is necessary, however, that their combined capacity shall be large, and therefore, in general practice, not less than ten two microfarad condensers or their equivalent are employed.

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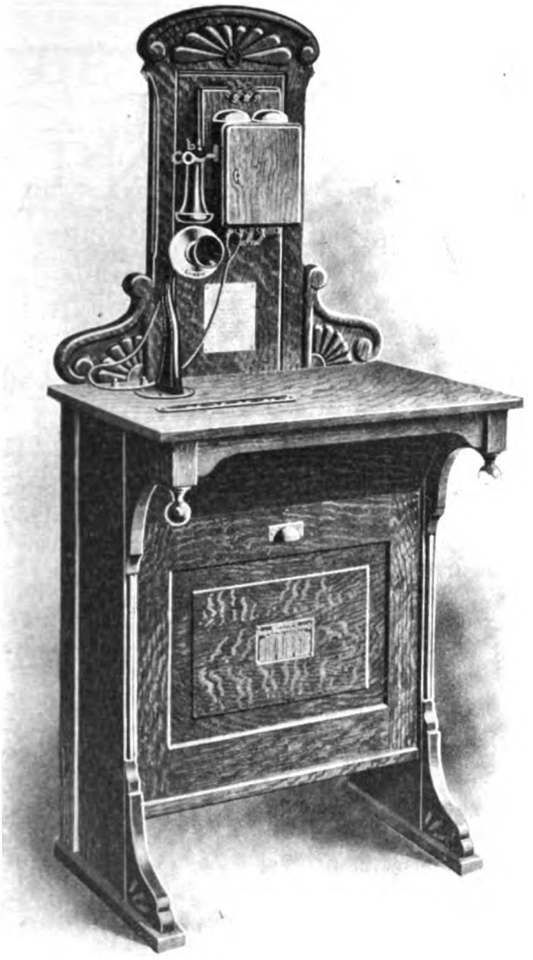

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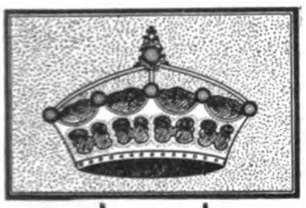

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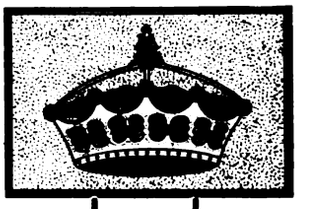

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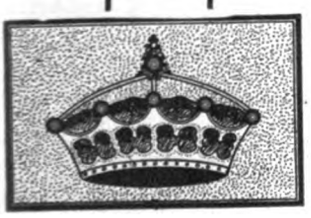

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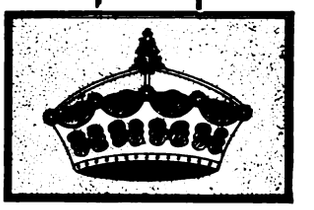

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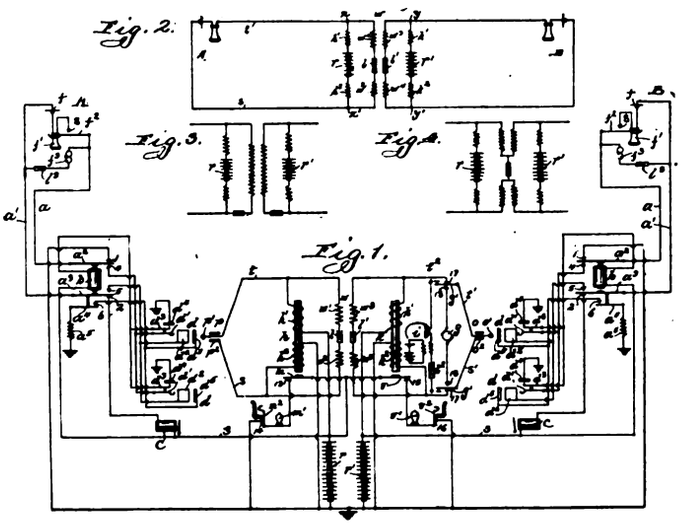
TELEPHONE PATENTS

TELEPHONE SYSTEM.

Kempster B. Miller, of Chicago, Ill., patents (No. 796,441, dated August 8, 1905; filed February 4, 1901; serial No. 45,928 and assigned by mesne assignment to Kellogg Switchboard and Supply Company, of Chicago, Ill.) a telephone system.

This invention has for its object, means by which the charging source of current is prevented from becoming short circuited through the windings of the repeating coil.

It consists of the special application of a condenser, by means of which the currents have impressed upon them the electromotive force variations necessary in telephone service, without



that continuity of circuit otherwise required by ordinary systems. In Fig. 1 the condenser is shown at *l l'* performing this new function. Fig. 2 shows the talking currents of two subscribers; on the same principle, Fig. 3 shows the condensers differently situated, and Fig. 4 shows the condenser used in common by both windings of the repeating coil. The characters w^1 w^2 w^3 w^4 in Figs. 1 and 2 are repeater coil windings. The inventor in his leading claim states, "means for preventing the current from passing through the winding of the repeating coil." This idea is embodied in the position of the condenser with regard to the other elements of the system.

MOUTHPIECE PROTECTOR.

Walter S. Llittle, Lynn, Mass., patents (No. 792,601, dated June 20, 1905; filed March 3, 1905) a sanitary attachment for telephone mouthpieces. The essential feature of this devise consists of a spring holder to engage the outer rim of a mouthpiece and to carry a diaphragm of some antiseptic material which will cover the opening.

TELEPHONE EARPIECE.

Peter Charles Green, Philadelphia, Pa., patents (No. 793,436; dated June 27, 1905; filed November 7, 1904; serial No. 231,630); a telephone earpiece. The blur of sound, resulting from holding the telephone receiver near the ear, is obviatd in this invention, by an acoustic device for concentrating the sound. The invention consists of an earpiece attached to the receiver and capable of entering the cavity of the ear itself. By this device the air waves completely enter the ear. The inventor claims the absence of air condensation within the shell, constituting this arrangement. The absence of condensation is claimed on the basis of a series of small holes piercing the wall of the shell employed. The acoustic lines of this appendage to the receiver are so constructed, that they convey air waves to the human ear perfectly, and exclude external noises.

TELEPHONE SWITCH.

Klas Weman and Melvin Bascom of New York, N. Y.; patents (No. 794,134; dated July 4, 1905; filed Oct. 16, 1903; serial No. 177,333); a telephone switch.

This invention has for its object an improvement in switches for intercommunicating telephones, whereby the hanging up of the receiver will, without the need of returning the switch to any particular point, automatically restore the switch to the receiving position, so that speaking connection may be established and the desired number called whether the telephone hook is up or down.

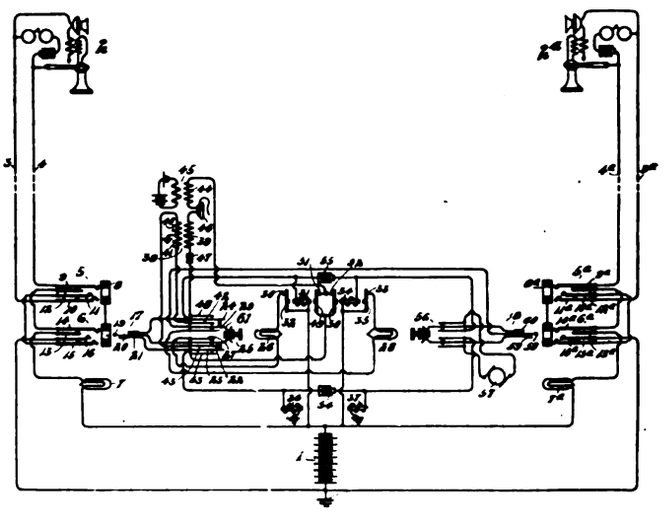
It consists of a device in which the act of replacing the receiver upon the hook will cause the switch to automatically return to the receiving position, without it being necessary to operate further. The essential element of the invention by which novelty is secured, is a rod carrying a series of contacts near its lower, and a push button at its upper end. This rod is described as laterally and rotatably movable. It is the purpose of the inventors to make this invention applicable to both metallic and common return systems.

EXCHANGE SYSTEM.

Elmer R. Corwin, of Chicago, Ill., patents (No. 795,961, dated August 1, 1905; filed September 3, 1904; serial No. 223,169) a telephone exchange system.

The purpose of this invention is to provide means by which the privacy of communication between subscribers is preserved. In other words, it establishes a method by which listening in cannot be done while the receivers at each end are off the hooks.

It consists, as shown in the illustration, of the elimination of all relays of a secondary order. During a connection, if the receiver at *either* of the two substances involved, is on its hook, the



corresponding contact of armature 49 against point 51 or armature 50 against point 52 will be closed, and it will be possible for the operator to listen in on the line by actuating the key 25. During the time, however, that *both* receivers are off the hooks, and the condition of actual conversation exists, such listening in will be impossible, because the contacts at 51 and 52 will both be open.

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WANTED—Competent telephone man wants position as superintendent of plant from 300 to 1,000 subscribers; Magneto system preferred. Best of references. Address Box 445, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 445

WANTED—Position by a thoroughly competent telephone man as wire chief, foreman of switchboard repairmen; ten years' experience; references; reasonable salary; married; age 33. Address Box 446, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 446

TO ALL TELEPHONE COMPANIES—If you are looking for a first class man for Wire Chief, Chief Inspector, Supervisor or Superintedent, write me. I am at present engaged with Bell Telephone Co., but would make a change at once for desirable company. I want a permanent position, fair salary. I can save money on maintenance, etc. Am patentee of several useful devices; married. My best reference is my work. I understand thoroughly how to handle help and distribute same to advantage. Have a few offers, but would be pleased to communicate with a few more parties. Let me hear from you. Adress Box 447, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 447

POSITION WANTED—By switchboard man. Eight years' experience in exchange work; good references; moral; temperate. Address R. F. DuRant, Greenwood, S. C. 448

WANTED—First class traveling salesman—telephone apparatus—telephone supplies.

WANTED—Man to handle corespondence for telephone manufacturing company. Address Box 449, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York. 449

POSITION WANTED—In small exchange, as manager, wire chief, or general all-around construction or repair work. Experience all branches telephone work; eight years. Best references. Address Box 450, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 450

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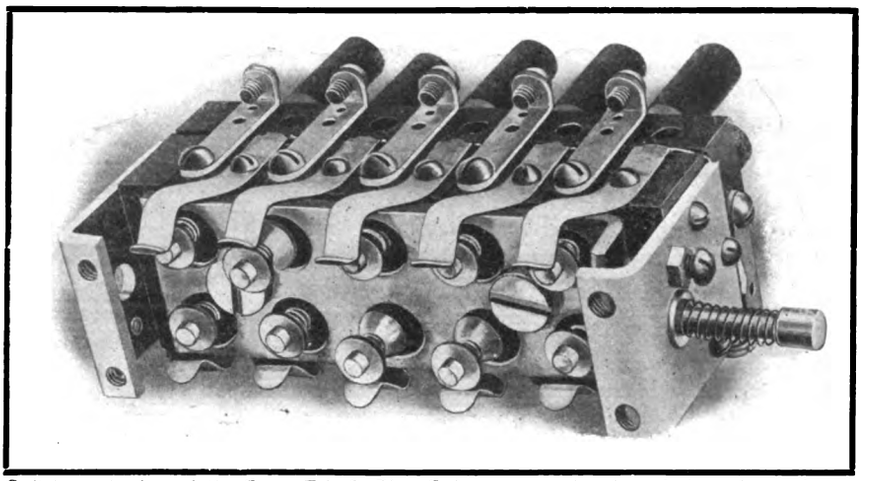
IN THE MANUFACTURING FIELD

"SUCCESS LIES IN THE KNOWLEDGE OF OUR TOOLS"

AN INTERIOR AUTOMATIC EXCHANGE TELEPHONE.

THE Connecticut Telephone & Electric Company, of Meriden, Conn., has placed upon the market an intercommunicating telephone for interior service with many valuable points of interest to every exchange man. This instrument can be connected to the exchange, and the manufacturers claim is the only one made for this purpose which is absolutely non-interfering. One of the many features is its new non-interfering exchange trunk button which is an exclusive "Conn." feature. This device is so arranged that it cuts the telephone off the interior system so that there is absolutely no chance for interference. With this telephone it is possible to call direct to any point in the system with the receiver on or off the hook. The switch mechanism is shown in the accompanying illustration. The buttons are automatically restored when the receiver is returned to the hook and the telephone is also cut off the line. It is also possible to call any number of departments together and hold a joint conversation. All connections in these instruments are mounted on hard rubber, thereby making a perfect insulation for the line connections, and all contacts are rubbing and positive. The plate of this instrument does not enter into the talking circuit as in some other makes of automatic telephones. It is made of steel, thereby doing away with the wear and tear of the brass cone and brass plate. It is a well known fact that brass against brass makes a poor wearing surface. With this construction chances for poor mechanical construction are eliminated. This instrument is being adopted by some of the largest exchanges. It is particularly adapted for common battery exchange service. The circuit arrangement is made for central location of the battery. The Connecticut Telephone Company has prepared a bulletin which it will send to any one interested. It will also be pleased to ship systems on trial to responsible parties.



Switch mechanism of the Conn. Tel. & Elec. Co.'s new type interior telephone for exchange service.

THE STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY, Rochester, N. Y., reports having closed contracts for switchboards for the following places: Kansas City, Mo.; Decatur, Ala.; Boise, Ida.; Creighton, Neb.; Unadilla, N. Y.; Maquoketa, Iowa; Granite Falls, Minn.; Charity, Mo.; Greenville, Ohio; Crystal, N. D.

THE CENTURY TELEPHONE CONSTRUCTION COMPANY, of Buffalo, N. Y., has just completed the installation of a common battery, lamp signal, multiple, switchboard equipment, having immediate capacity of 60 lines, for the exchange of the Princeton Telephone Company, Princeton, Ind. This equipment also includes toll position.

It has recently shipped switchboard equipments to The Southern Cayuga Telephone Company, for Poplar Ridge and Aurora, N. Y.; West Lake State Telephone Company, Skaneatles; Conewango Telephone Company, South Dayton, N. Y.; Canisteo Telephone Company, Canisteo, N. Y.; Plattsburg Overland Telephone Company, Plattsburg, N. Y.; Wellsville Telephone Company, Wellsville, N. Y.

It has also received orders for switchboard equipment to be shipped to the Patrons Telephone Company, Fulton, N. Y., and the Patrons Telephone Company, Lamson, N. Y.

This company at the present time is making extensive increases to its factory so as to take care of the large increase in its business.

G. M. GEST, subway contractor of New York and Cincinnati, has been awarded a contract at Fitchburg, Mass., for the construction of a complete subway system for the Fitchburg Gas & Electric Light Company. This makes the fifth city in Massachusetts in which Mr. Gest has constructed conduit systems.

NEW TYPE CONDENSER FOR BRIDGING LINES.

THE Electric Appliance Company of Chicago, Illinois, is placing on the market a special condenser for use on bridging party lines. This condenser is of less than ½ microfarad capacity and known as the X. P. type. It is a result of a series of experiments instituted to determine along what lines and of what capacity a condenser should be made, that would act as a choke or impedance to the low frequency current given out by the telephone generator and at the same time add no apparent or appreciable impedance to the high frequency, secondary or talking current.

As is well known, there are times when it is impossible with a four or five bar generator to ring the desired party on a party line because of subscribers listening in. Listening in causes the line to be shunted through the low resistance path of the telephone, and the secondary winding of the induction coil, consequently the ringers do not receive enough current to operate them.

With the X. P. Condenser, the company claims that the twentieth telephone on a line can be rung with 18 receivers down, provided it is possible to ring every one on the line with the receivers on the hooks.

These condensers are subjected to 125 volts, direct current, as a break-down test, and some instances have been found in which these condensers stood as high as 400 volts without being damaged. The actual size of the condenser is ¾ x 2¾ x 1½ inches, including the terminal clips. On account of their small size it is possible to install them in all existing bridging telephones. Further information will be furnished by the company.

THE WESTERN STEEL GATE COMPANY, Green Bay, Wisconsin, announces the removal of its plant to that city from Two Rivers, Wisconsin. It has increased its manufacturing capacity and now

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SUMTER

SOLD ON QUALITY-NOT ON PRICE

ONCE A CUSTOMER—ALWAYS A CUSTOMER

Sumter apparatus must be superior, otherwise this couldn't be true.

We have been making and selling telephones and switchboards for 8 years.

In all this time we have enjoyed a constantly increasing demand for our products.

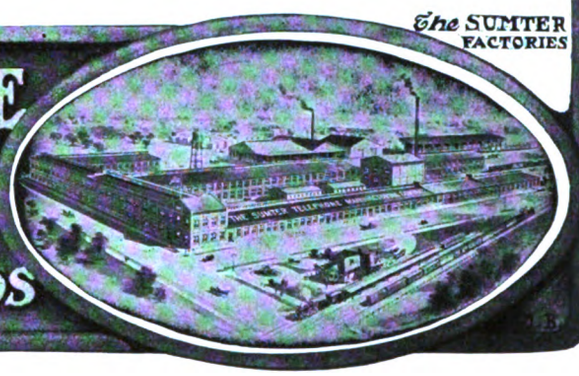
Our customers of 8 years ago are still buying Sumter apparatus.

Why?

THE SUMTER TELEPHONE MANUFACTURING CO.

SUMTER, S.C., U.S.A.

TELEPHONES, SWITCHBOARDS



SAVE YOUR MONEY

INCREASE YOURP ROFITS

Buy Your Telephones and Switchboards from us.

Our Columbia 'Phones can't be beat for Quality and Price.

Write for Our Price and List of Second-hand Equipment.

Special attention given to Telephone Repair Work.

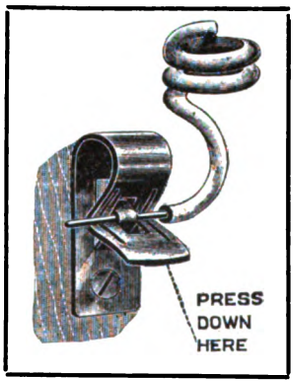
We are always in the Market to Buy your old 'Phones and Switchboards.

GUARANTEE TELEPHONE & EQUIPMENT CO.

60-68 W. Van Buren Street.

CHICAGO, ILL.

REMEMBER



Batteries cost no more when equipped with the Fahnestock Spring Binding Post than with the old style Screw Post.

Let us send you a sample. It's free.

Fahnestock Transmitter Co.

132 HAVEMEYER STREET, BROOKLYN, N. Y.

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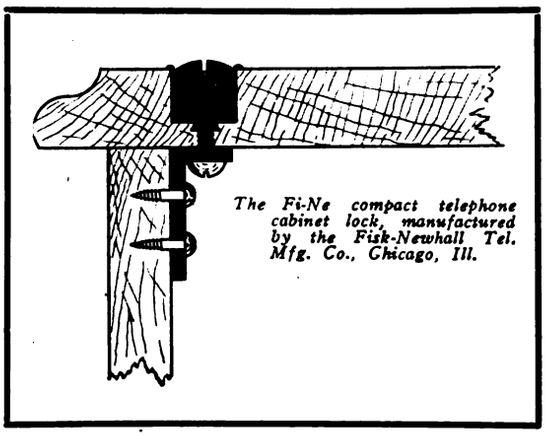
operates one of the best machine shops in Northern Wisconsin. This firm manufactures the well known western post hole digger and is prepared to furnish this device in any desired quantity.

A NEW CABINET LOCK.

TO fulfill the demand for a telephone cabinet lock which shall be simple and yet positive in action, the Fisk-Newhall Telephone Manufacturing Company, of Chicago, has recently devised the "Fi-Ne" lock shown in the accompanying illustration. A bracket is mounted within the box, drilled and tapped to receive a machine screw. A hole is recessed in the cover and bushed with a metal lining. A specially designed locknut is provided which, when the door is in position, is threaded on the projecting screw, and when tightened up sets flush with the woodwork. The advantage claimed by the manufacturers is that the use of a screw lock is the only practical method of fastening the cover on account of warping. Further information will be sent upon request.



The Fi-Ne compact telephone cabinet lock, manufactured by the Fisk-Newhall Tel. Mfg. Co., Chicago, Ill.

THE NATIONAL BATTERY COMPANY, Buffalo, N. Y., has elected the following officers: John R. H. Richmond, president; James Macnaughton, vice-president and general manager; Ralph Kimberly, secretary and treasurer; R. L. Coleman, chairman of the board of directors. The company has in view extensive developments of its business which will greatly add to its field of activity. All the departments are in charge of specialists in their line and every endeavor is made to keep the working forces up to the top notch of mechanical and electrical skill.

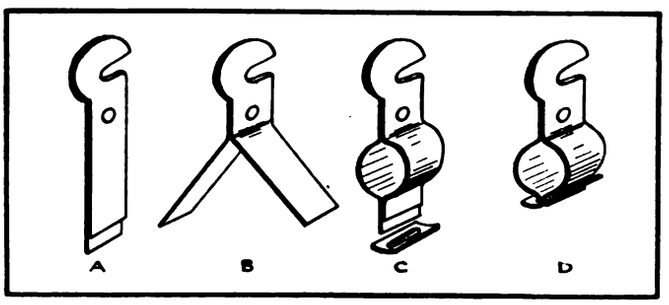


Fig. 1. New type cable hanger showing its method of attachment to cables.

THE BAIRD MANUFACTURING COMPANY, 6 Michigan street, Chicago, claims as one of the advantages of its secret service system, than any standard bridging telephone can be converted into one having all of the Baird Secret-Service advantages by its No. 11, Lock-Out & Selective Ringing Attachment. This can be done in about ten minutes by any one familiar with subscriber's instrument circuits.

The emergency button enabling locked-out subscribers to call central in case of necessity when line is in use, is a feature peculiar to this system, and one of vital importance.

The central office calling device from which all telephones equipped for secret-service are controlled, can be attached to any type of switchboard now in use without in any way cutting or marring the board or interfering with the cords for other service. Their booklet, "Secret Service on Party-Lines," which fully describes the system, will be sent free upon application.

NEW CABLE AND MOULDING HANGER.

A DIFFICULTY hitherto experienced in attaching cable, moulding, or conduits to girders has been the lack of a suitable support. The Chase-Shawmut Company, of Newburyport, Mass., has perfected such a device which is simple in operation and effects a great saving of time in cable installation. The accompanying diagrams illustrate its design and application. The hanger prior to attachment is shown at *A*, Fig. 1. After it is spread to receive the support it assumes the form *B*. When the support is in position the ends are brought together to receive the key as shown at *C*. The final appearance of the hanger with the ends bent back and locked is depicted at *D*. Fig 2 shows three cables being supported to a girder by the means of two of these devices. The only tool necessary for the attachment of these hangers is a pair of plyers, and they can be placed in position at an average rate of one a minute. The material used in their construction is the annealed steel which combines two essential qualities, viz.: strength and pliability. Besides the type illustrated the company manufactures others which are fully described in Bulletin 33, which will be mailed upon request.

THE DEPARTMENT OF COMMERCE AND LABOR, Washington, D. C., is sending out printed forms to secure information from manufacturers which will enable it to greatly extend the foreign trade of the United States. In pursuance of this plan a comprehensive card index will be established which will enable the department to furnish full detailed information to prospective purchasers. To enable the bureau to prepare such an index all manufacturers are requested to furnish such information as they desire to have recorded. Those not having received these blanks should make immediate application to enable the department to compile the lists as soon as possible.

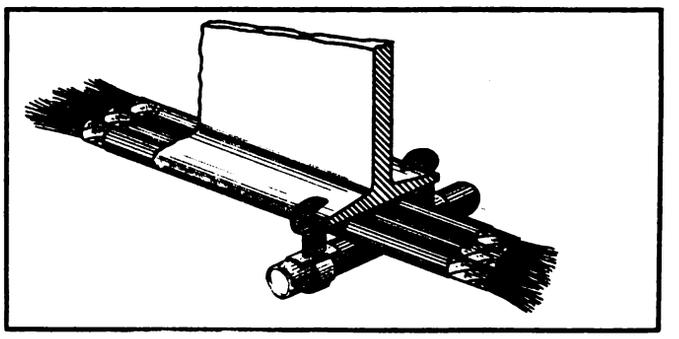


Fig. 2. Cable hanger in position. Manufactured by the Chase-Shawmut Co., Newburyport, Mass.

THE GREEN TELEPHONE AND ELECTRIC COMPANY, Milwaukee, Wis., has opened offices at 933, 934 and 935 Monadnock Block, Chicago. C. A. Turner is in charge of this branch of the business. The large demand for high grade, well designed and efficient telephone outfits have led this company to make a specialty of intercommunicating telephone equipments. It has been necessary for them to make greater provision for the expansion of their business, in order to attend to its demands with promptness and satisfaction. The Chicago office will add greatly to its facilities in this respect.

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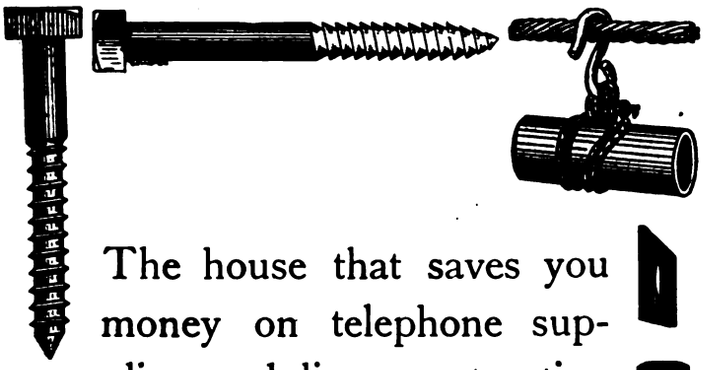


The house that saves you money on telephone supplies and line construction tools and specialties

We guarantee our goods and ship promptly

Place a "trial" order and see if it isn't so

Our Free Estimate Blank is a great help

Write us to-day

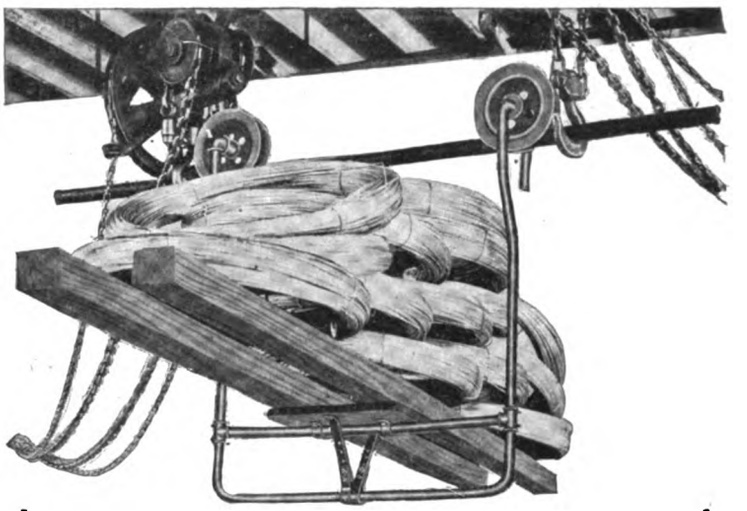
SCHAPER CONSTRUCTION MATERIAL CO.

Electrical Exchange Bldg.
136 Liberty St.
New York City

Security Cable Cars

ARE SAFE, ABSOLUTELY

EACH ONE TESTED FOR 1000 LBS.



Made from iron pipe continuous, without joints. Look at the cut. Malleable rollers thin and light, will not break nor chip. Seat adjusts up or down.

Price with table, - - $10.00
Price without table, - - 7.50

THE F. BISSELL COMPANY.
TOLEDO, O.

DIRTOLOGY

is a heavy subject, it is deep and well worth digging into. It tells about my land anchor that, buried four feet under the soil, guys a pole more strongly and solidly than is possible by any other method, and still better, is the cheapest known method of guying poles. My anchor is the "Bull Tongue," the most practical anchor made.

Dirtology sent free.

I. A. BENNETT
141 South Clinton Street Chicago

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THE WEEK'S MESSAGES

FINANCIAL.

MOBILE, ALA.—The Home Telephone Company will increase its capital stock to $350,000 and issue a similar amount of bonds.

PADUCAH, KY.—At a meeting of the People's Independent Telephone Company the value of the plant and property has been fixed at $118,400.

TABLE ROCK, NEB.—The Table Rock Telephone Company has increased its capital stock from $3,000 to $10,000. The company intetnds to extend its rural lines quite extensively.

FRANCHISES.

ONTARIO, CAL.—The Home Telephone & Telegraph Company has applied for a franchise in Ontario.

MARION, IND.—The Converse Telephone Company has applied for a franchise in this city.

HATTIESBURG, MISS.—J. A. and S. A. Jones, and Geo. D. Winter of Chicago, have been granted a franchise to build an underground telephone system.

COMBINATIONS.

TAHLEQUAH, I. T.—The Cherokee Telephone Company has been absorbed by the Pioneer Telephone and Telegraph Company.

NEOSHO FALLS, KAN.—H. T. Feasel has purchased the telephone business of W. W. Finney.

CALDWELL, OHIO.—At a meeting of the different companies composing the Farmers' Telephone Exchange of Noble county, a consolidation of the Dexter City, Caldwell, Mt. Ephraim, Pleasant City and Senecaville companies was affected. Among the representatives were: C. L. Stranathan, William Miley, Silas McLaughlin, Herman Williams, John Miley, W. E. Keith, L. D. Headley, H. W. Kuntz, L. W. Wheeler, E. W. Spannagel and J. M. Murphy.

NEW COMPANIES.

DANBURY, CONN.—The Rogers Telephone and Electrical Company has been incorporated with a capital stock of $25,000 to manufacture telephones and electrical machinery. The incorporators are N. Burton Rogers and Geo. L. Eastman, of Orange, N. J.; C. B. Rogers and A. F. Davenport, of Danbury, and Frank E. Nisks, of New York.

BOISE, IDAHO.—The Pacific & Idaho Northern Telegraph & Telephone Company has been incorporated with a capital stock of $100,000. The incorporators are: L. C. Van Riper and Jos. N. Dever, of New York, and L. Hall and Frank Gribben, of Weiser.

MALLARD, IA.—The Mallard Telephone Company has been incorporated with a capital stock of $10,000. Incorporators: J. P. Mulroney and others.

WOODWARD, IA.—The Woodward Mutual Telephone Company has been incorporated with a capital of $15,000, by S. B. Shaumway and others.

ADE, KAS.—The Rural Telephone Company, of Ade, Kas., has been organized to build an exchange in Ade and rural lines in the surrounding territory. J. W. Bezek is secretary.

LARNED, KAS.—The Pleasant Valley Telephone Company has been incorporated with a capital stock of $2,000.

ROCK CREEK, KANS.—The Rock Creek Mutual Telephone Association has been incorporated. President, C. S. Hunter; secretary, Dr. L. V. Sams; treasurer, Wm. McClure; director, Geo. Hatfield.

WHITING, KAS.—The Farmers Mutual Telephone Company has been incorporated with a capital stock of $9,600.

BROWERVILLE, MINN.—The Browerville Telephone Company has been incorporated with a capital stock of $10,000. Incorporators: Thomas Heid, H. E. Hart, J. H. Steets, J. F. Sarff, Harry Lee, Lambert Irsfeld and W. H. Gray.

WALKER, MINN.—The Farmers' Mutual Telephone Company has been incorporated.

SHELBYVILLE, MO.—The Shelby County Telephone Company is being organized to furnish telephone service to Shelbina, Bethal, Leonard, Kirby, Hagergron, Clarence and other points. Five hundred subscribers are expected for a start.

CLARENCE, N. Y.—The Pioneer Telephone Company, of Clarence, has been incorporated with a capital stock of $10,000. Incorporators: G. D. Carmer, Clarence Center and others.

EAST CONCORD, N. Y.—The East Concord Telephone Company has been incorporated. Capital, $5,000, and directors Samuel D. Varner, East Concord; Ward H. Moore, East Concord; Fred F. Mayo, East Concord.

RARDEN, O.—L. Taylor and D. T. Blackburn, of Rarden, are organizing a new telephone company. They will extend the line to Lucasville, and also establish a branch at Ladd.

SPRINGTOWN, PA.—The Franklin Telephone & Telegraph Company, of Springtown, has been incorporated with a capital of $5,000.

EL CAMPO, TEXAS—The Cost Telephone Company, of El Campo, Wharton county, has been incorporated. Incorporators: T. J. Poole, of Matagorda; E. H. Koch and F. J. Hardy, of Wharton county.

SHERMAN, TEXAS.—The North Texas Telephone Company has been incorporated with a capital stock of $10,000. Incorporators: B. J. McHugh, W. L. Porter and others.

LYNCH, VA.—The Lynch Telephone Company has been incorporated with a capital stock of $5,000. Incorporators: W. Fauntleroy, W. S. Frazier and W. T. Webb.

CHICAGO, ILL.—The city will operate its own fire and police telephone service.

PERSONAL.

A. S. ADAMS has been appointed manager for the Home Telephone Company at Joplin, Mo.

J. H. COWAN has been appointed local manager for the Pioneer Telephone & Telegraph Company, at Atoka, Indian Territory.

W. R. HIND, an Iowa salesman, is utilizing a novel idea in drumming up business. This takes the form of a souvenir postal card, a reproduction of which is herewith given. This card is printed in two colors, black and buff, the latter being used for the suit case. At the bottom of the card a message is printed which reads, "I am waiting for your order," and as these cards are mailed to parties before Mr. Hind calls, it offers a good method of introduction.

Z. G. HOUCK has been appointed manager of the Citizens' Telephone Company with general offices at Kenosha, Wis.

C. B. HULL has been appointted manager of the McComb, Ohio, Home Telephone Company.

W. R. KINGSTON has been appointed superintendent for the Sunset Telephone Company, at Palo Alto, California.

J. H. LYON has been appointed district manager for the Michigan State Telephone Company, at Houghton, Mich.

FRANKLIN J. MAYER has been appointed district manager for the Bell Company, at Madison, Wis.

LOUIS PETTIT has been selected for the managership of the Park City exchange of the Utah Independent Telephone Company.

E. P. PLATT has been appointed local manager for the Michigan State Telephone Company at Grand Rapids.

O. W. REID has been appointed manager for the Southwestern Telephone & Telegraph Company at Walnut Ridge, Arkansas.

L. W. RIGLEY has been appointed superintendent of cable construction for the Southern Bell Telephone Company at Birmingham, Ala.

F. A. WHARTENBY has been appointed manager for the Pioneer Telephone Company, at Oklahoma City, Oklahoma.

GEO. H. WILDER has been appointed manager for the Citizens' Telephone Company, at Akron, N. Y.

ELECTIONS.

ONSTED, MICH.—The Onsted Telephone Company has elected the following officers: President, L. S. Mann; Vice-President, E. C. Truner; Secretary, J. B. Daniels; Treasurer, C. E. Greenleaf.

ASHVILLE, N. Y.—The Ashville and Panama Telephone Company has

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Kellogg Switchboard and Supply Co.

CHICAGO, ILL.

Wholesalers of **Michigan White Cedar** **POLES** *of* **QUALITY**

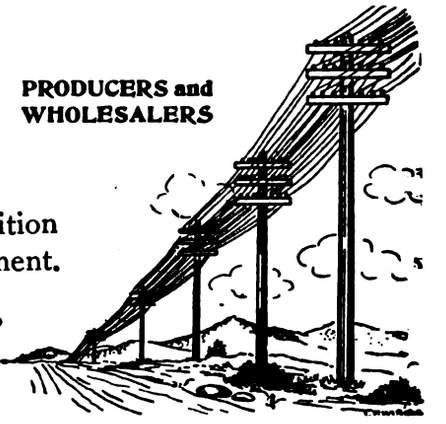
Five Yards ***Prompt Shipments***

PITTSBURG & LAKE SUPERIOR IRON CO.,
ESCANABA, MICHIGAN.

PRODUCERS and WHOLESALERS

WE always carry a large stock of all sizes of White Cedar Poles, and having yards on all principal railroads in Northern Michigan and Minnesota, are in position to make immediate shipment.

"From the Stump to the Line."



COMPARISON SHOWS THAT

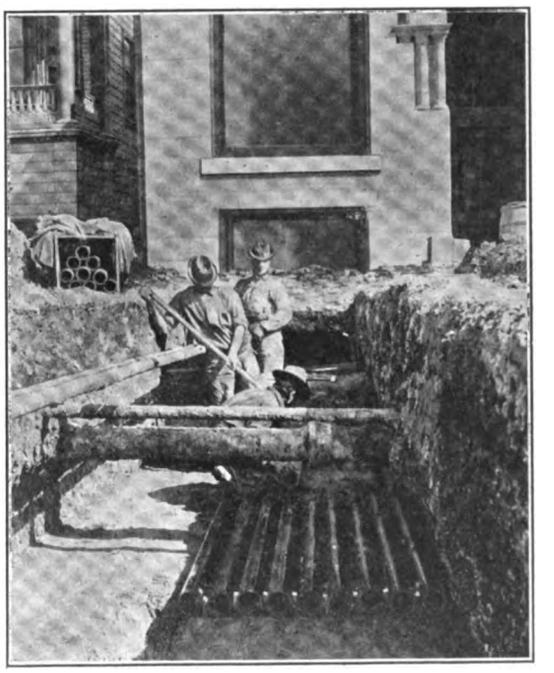
Some Poles are Good;
Others are better, but the
Sand Point Cedar Company's
Are the BEST.

Because our location enables us to
Cut only that timber which has the
Necessary qualifications of
Soundness, Strength and Straightness.

Hadn't you better write us for
Quotations upon Superlative
Quality Cedar Poles?
They cost no more than the other kind.

SAND POINT CEDAR CO.
SAND POINT, IDAHO

BITUMINIZED FIBRE CONDUIT
For Underground Construction



The American Conduit Company has a corps of experts in underground construction and is prepared to furnish supervision of work if desired. We would prefer to co-operate with contractors in underground construction, but if desired will submit estimates and bids and take contracts for completed underground systems in any part of the United States or Canada.

AMERICAN CONDUIT COMPANY,
Main Offices, 1005-6 Manhattan Building, Chicago
Other Offices, 170 Broadway, New York 336 Macy Street, Los Angeles

Please mention THE AMERICAN TELEPHONE JOURNAL when writing to ADVERTISERS.

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THE WEEK'S MESSAGES—*Continued*

elected the following officers: President, George W. Appleby; Vice-President, A. John Peterson; Secretary and Treasurer, Alton H. Appleby.

BRENHAM, TEX.—The Brenham and Shelby Telephone Company has elected the folowing officers: T. A. Low, president; Joe Mikeska, vice-president; E. C. Lass, second vice-president and business manager; Ben Schmid, secretary and treasurer; E. Reichardt, L. F. Harris, R. Strickert, Dr. E. R. Knolle and Charles Fischer. directors.

UNDERGROUND

BEAVER FALLS, PA.—The Beaver County Telephone Company is installing an undergroung system.

COUNCIL BLUFFS. IA.—A contract for seven miles of underground conduit has been let to a local firm.

New Construction in the Field

NEWPORT, ARK.—The Patterson Telephone Company is building a new line to this point.

LA JOLLA, CAL.—The Home Telephone Company is building a new line from Los Angeles to this point.

MELITA, MANITOBA, CAN.—The Melita-Arthur Telephone Company is to extend its line to West Hope. Lines will also be run to Elva and Pierson.

PEORIA, ILL.—The Citizens' Telephone Company is buildiing several new toll circuits.

FT. WAYNE, IND.—The National Telephone and Telegraph Company is to extend its line to Ft. Wayne and Churubusco.

GOSHEN, IND.—The Home Telephone Company will spend $2,500 in improvements and new construction.

FAULKTON, IA.—The Western Telephone Company is extending its lines in all directions from this point.

FORT DODGE, IA.—The Fort Dodge Telephone Company has been installing new telephones at the rate of fifteen a week for the past three months. In order to catch up with the demand for service; this number will be doubled in the future.

REINBEEK, IA.—The Home Telephone Company is installing a new switchboard with a capacity of three hundred lines.

WEST POINT, IA.—The German American Telephone Company is erecting a two-story office building in this city.

BUHLER, KAS.—The Burton-Inman Telephone Company, of Burton, Kansas, is building an exchange at this point.

CHANUTE, KAN.—The Warham & Wood Telephone Company will install a new switchboard and otherwise improve its system in this town.

WHITING, KANS.—The Farmers' Mutual Telephone Company will extend its line to Horton. The line will be in operation inside of thirty days.

WELLINGTON, KAN.—The Mutual Telephone, Engineering & Supply Company, of Wellington, Kan., has nearly completed its contract with the Barber County Telephone Company; when this is complete the Barber County Telephone Company will have two exchanges and over 200 miles of rural lines.

CHINA, ME.—The China Telephone Company is extending its rural lines.

RIDGELY, ME.—The Farmers' & Merchants' Telephone Company has completed its system in this town.

COLRAIN, MASS.—The Heath Telephone Company is running a new line from Shelburne Falls through East Colrain to West Leyden.

BENTON HARBOR, MICH.—The Twin City Telephone Company will expend $25,000 in improvements to its local system.

ITHACA, MICH.—The Union Telephone Company is building several new lines and enlarging its exchange at Elsie.

LEWISTON, MINN.—The Tri State Telephone Company is constructing a long distance line through this point.

MINNEAPOLIS, MINN.—The Twin City Telephone Company will build a new exchange at Meriam Park, at a cost of $40,000.

ASHLAND, N. H.—The Citizens' Telephone Company is installing its lines at Ashland.

LEBANON, N. J.—The Lebanon Telephone Company is making several additions to its system.

OSWEGO, N. Y.—The Ontario Telephone Company will build a two-story exchange building, 30 x 96 feet in ground area.

MANETTA, OHIO.—The Manetta Telephone Company is building a new line to Sand Hill.

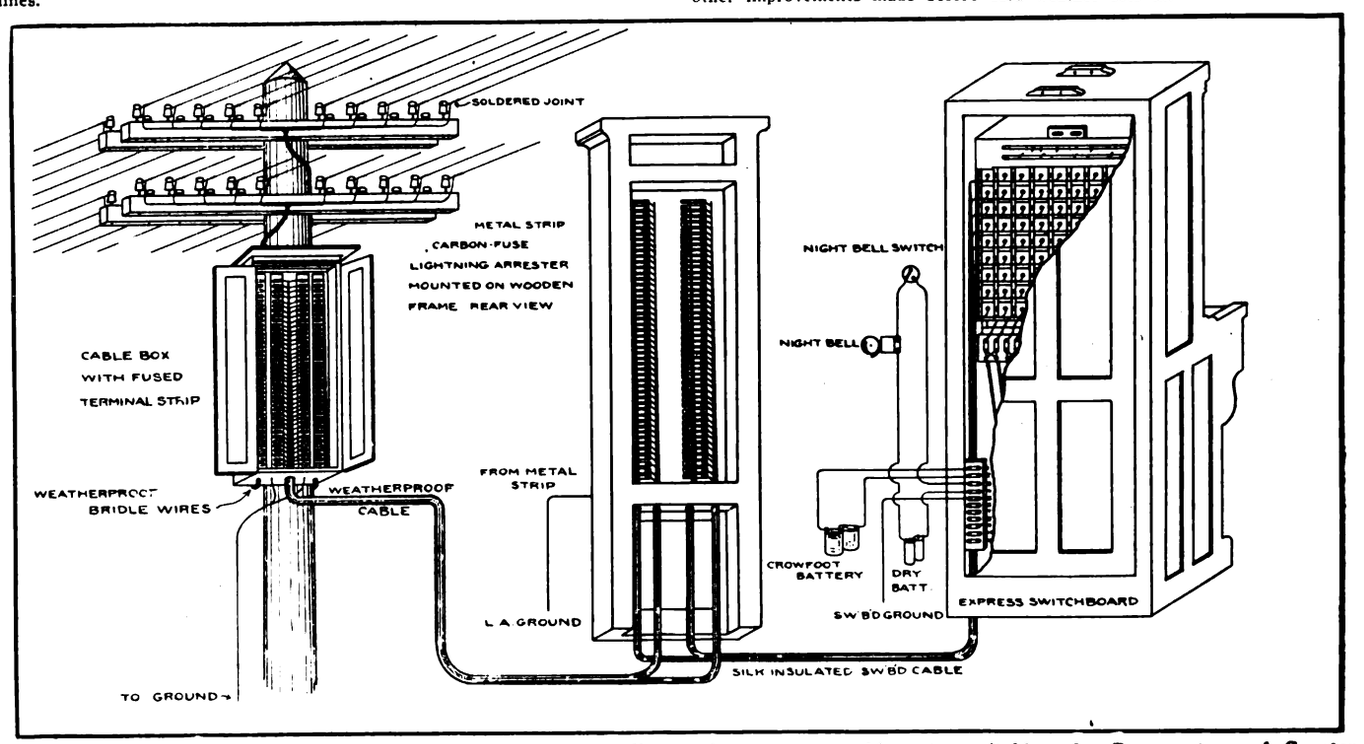
STEUBENVILLE, OHIO.—The Phoenix Company is to install a new automatic telephone exchange. The cost will be about $20,000.

PLANKINTON, S. D.—A new company is being organized here and will build a modern system.

DALLAS, TEXAS.—The Texas Consolidated Telephone Company will build a line from Dallas to Fort Worth.

RIPLEY, W. VA.—The Citizens' Telephone Company is preparing to extend its lines to Parkersburg.

KAUKAUNA, WIS.—The Fox River Valley Telephone Company will install a new switchboard having an immediate capacity for one thousand subscribers. New toll lines will be built to Appleton and Green Bay and other improvements made before cold weather sets in.



Cable circuits and connections from terminal pole through light ning arrester cabinet to switchboard. ***By courtesy of Sumter*** *Telephone Manufacturing Company, Sumter, S. C.*

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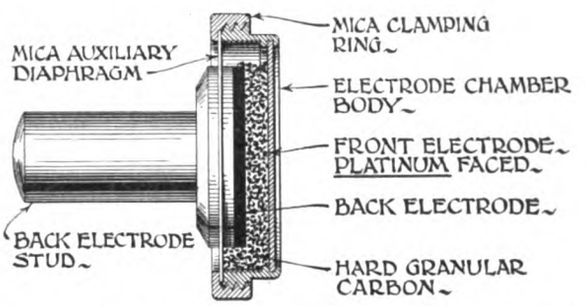
The New Dean Transmitter



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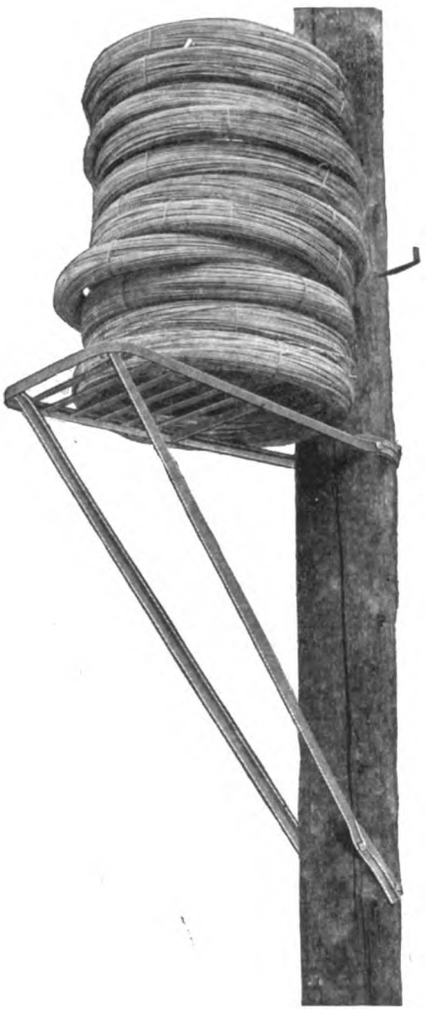

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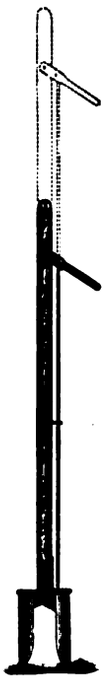

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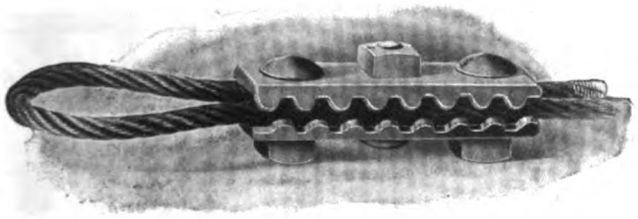

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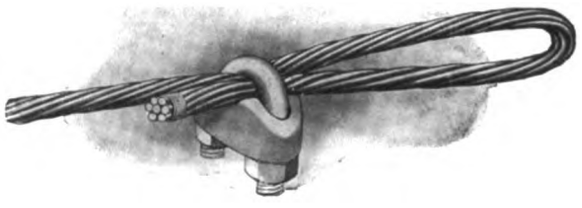

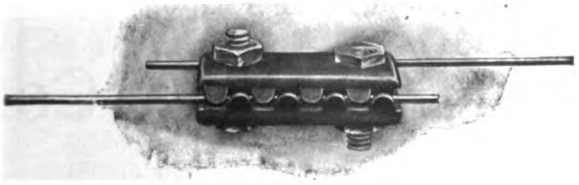

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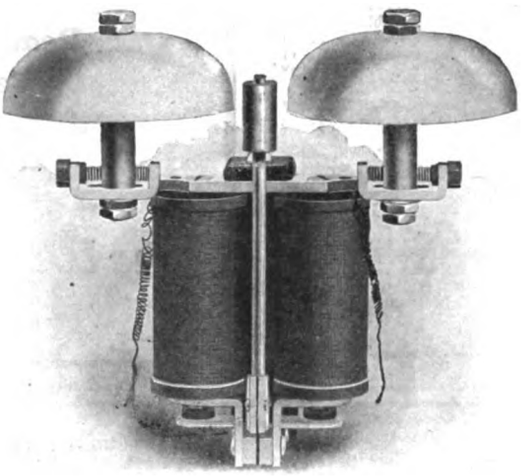

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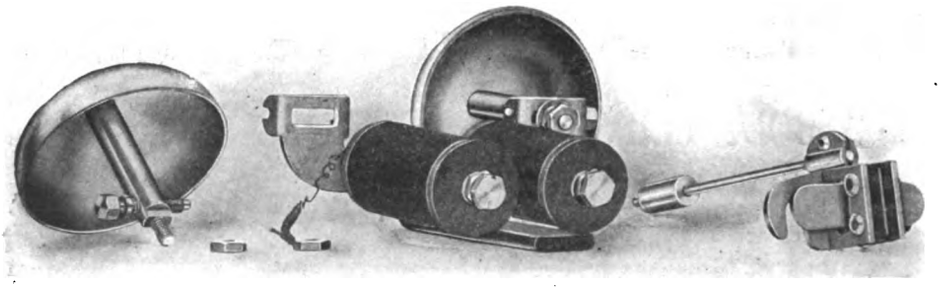

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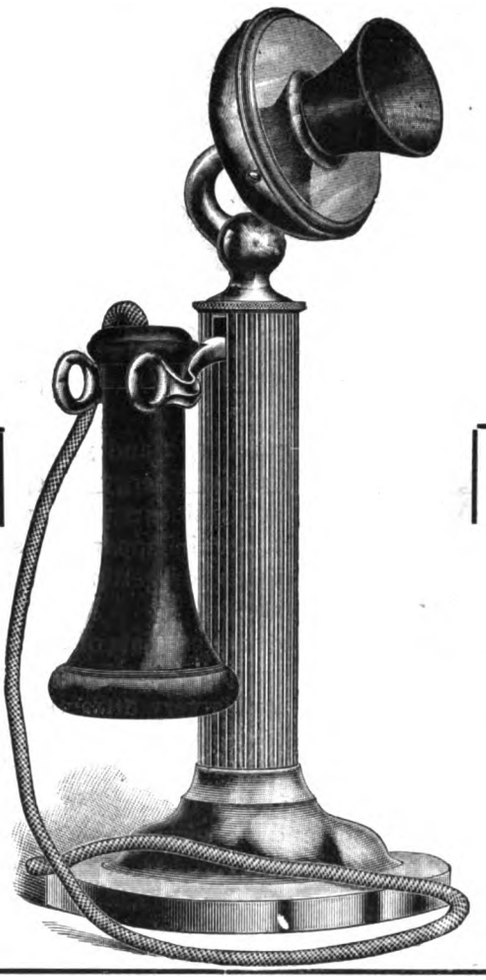

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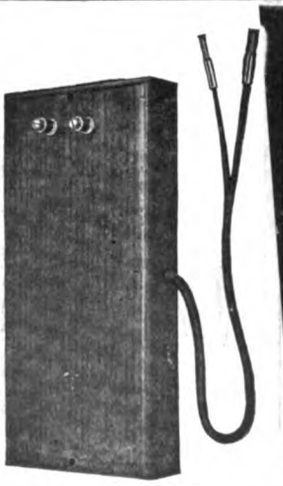

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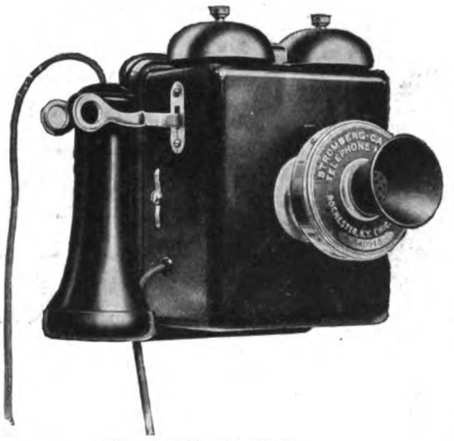

Fig. 1. Closed View.

Figures 1, 2 and 3 show illustrations of our new all-metal Central Energy Telephone, designed principally for hotels and residences. The instrument is very small and compact, yet the apparatus is so arranged that there is sufficient space for getting at any of the parts for inspection or adjustment.

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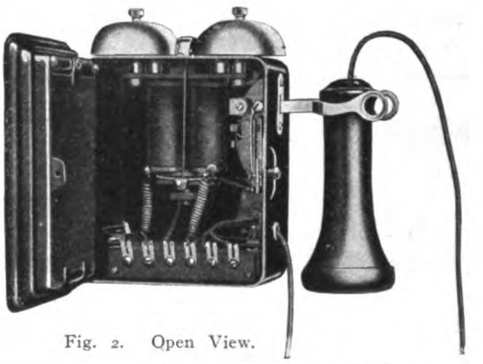

Fig. 2. Open View.

Fig. 3. Side View.

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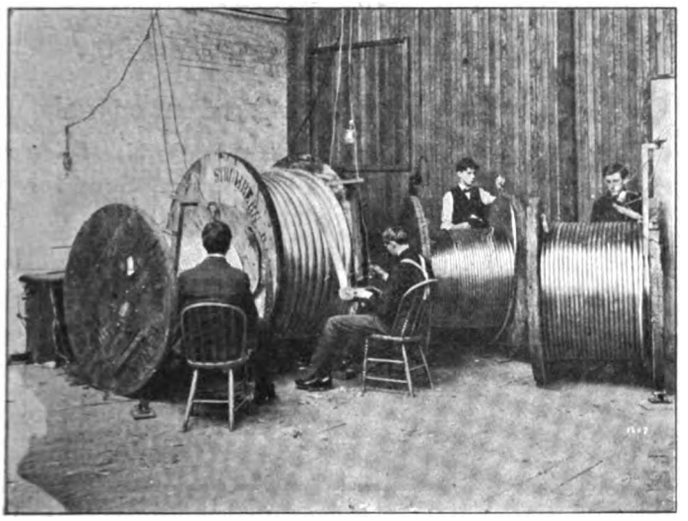

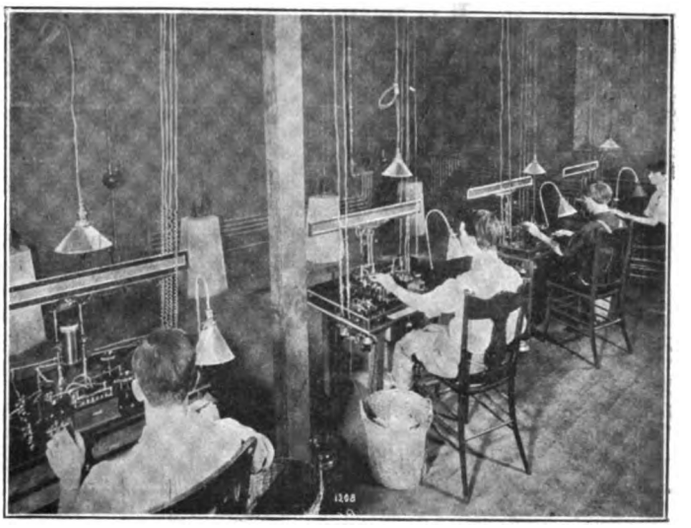

The above illustration shows our method of testing the cables. This is done by experienced men using highly sensitive reflecting galvanometers. All results are obtained by comparison with those of certified standards in the following manner: The deflections are taken from each pair, both for insulation and capacity, and then the deflection from the wires are taken upon the same galvanometers thus giving accurate results.

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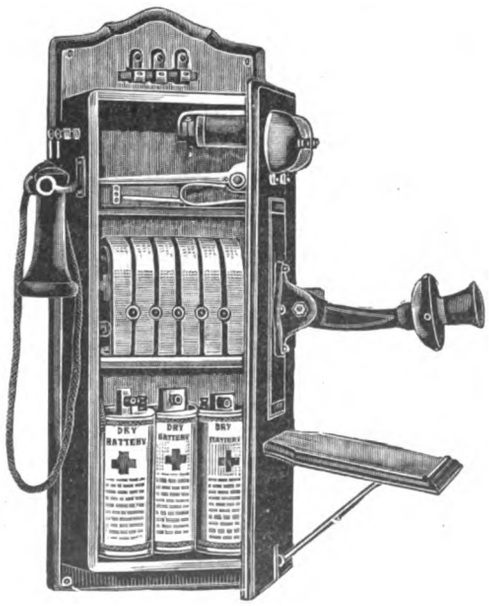

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A Secret Keyboard Circuit

By Robert Burlingham.

In view of the recent activity of inventors in devising means to prevent operators listening to conversations of subscribers, it would seem that the telephone art had reached a state of development where a betterment of the service in this direction may be expected. The introduction of common battery systems and the extensive use of metallic lines portend that nothing should be left undone to further improve the service, which does not involve the addition of too much apparatus or complication of circuits.

With the advent of the double supervisory signals as used in common battery systems, many engineers questioned the necessity of operators listening in for the purpose of monitoring the connections. Certain it is that this feature has always been objectionable to many of the subscribers. It is of interest, therefore, to note that in the National-Interstate Telephone Association Standard Operating Rules, compiled by a committee of experts representing six of the most successful operating telephone companies in existence, and adopted at the June convention of the association, there appears, under the heading of "Listening to Conversation," the following: "In no case shall the operator listen on a subscriber's conversation more than is absolutely necessary to insure proper connection. On modern systems no listening whatever is necessary."

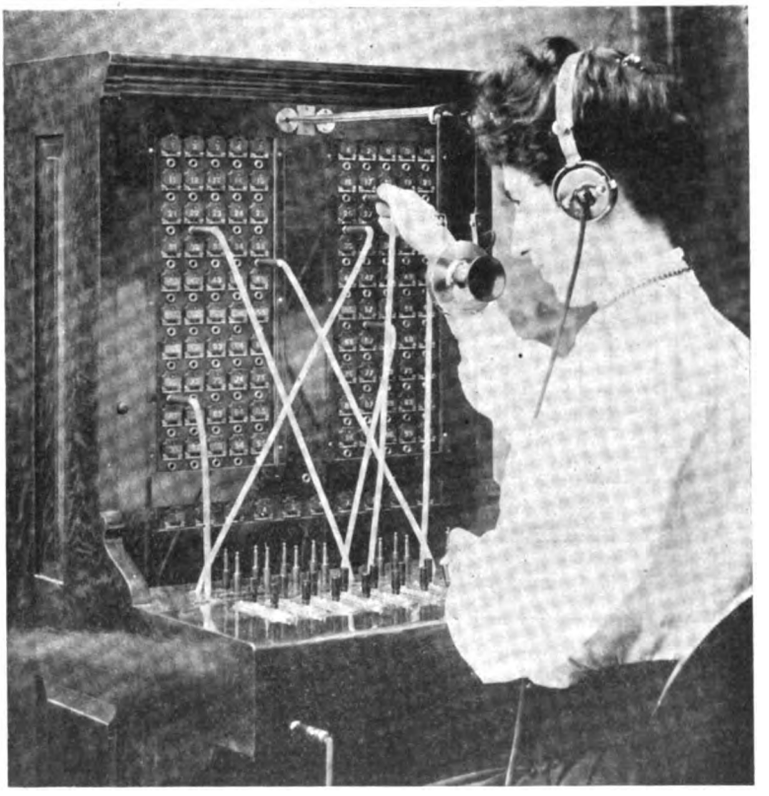

Fig. 1. Front view of board while in service.

There seems to be indeed no necessity for an operator listening in upon busy connections where the equipment includes double supervisory signals by which she can see at a glance whether two subscribers' lines are connected together. Such an exchange equipment which further provides means for preventing the operators listening in on busy wires and thereby securing absolute privacy of communication, will not be at fault from the standpoint of correct operation.

The record of telephone patents evidences that inventors have been devoting some thought and ingenuity to providing means for securing secrecy. In general, however, this has been attempted with the aid of auxiliary apparatus, and sometimes sought to be accomplished along with sundry other objects requiring extensive innovations in present methods of practice.

A patent recently granted to Richard M. Beard, of New York, embraces claims which indicate its being the first practical method for ensuring this result. No attempt is made in this invention to change or modify the usual exchange methods now in universal use, further than is essential to provide secrecy. Especially noteworthy is the absence of additional apparatus in the equipment.

The circuits are ingenious and simple, as illustrated in the drawings Fig. 3 and 4. The accompanying photographs, Figs. 1 and 2, show a one hundred line switchboard designed by the inventor for testing the practical operation of this system with the most unfavorable method of practice, namely, the magneto-call system. The board is used as a portable exhibit and will be shipped from place to place in order to give operating companies having magneto exchanges an opportunity to test its utility. The photos were taken while the board was in service in the exchange of the Elizabeth Telephone Company, of Elizabeth, N. J., of which M. T. Van Houten is manager. About one hundred subscribers were changed over from the regular switchboard to the exhibition equipment and suitable arrangements made for trunking between the old and new sections. The operators experienced no difficulty through inability to listen on busy lines.

Fig. 1 is a front view of the board. Attention is drawn to the two rows of keys. The front row are two-way listening-keys of the vertical type, arranged for listening upon either cord of a pair. To listen on the front cord, the listening-key lever is pulled toward one and moved backward to listen on the back cord. The back row of keys are two-way ringing keys, for ringing upon either cord of a pair. Their operation is similar to that of the listening-keys. A listening-key and a ringing-key for each pair of cords are mounted on the same escutcheon plate. The clearing-out drops are mounted in a separate panel, each

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being directly in front of and by location readily associated with the pair of cords and two keys to which it belongs. In the illustration several pairs of cords are shown busy and the operator in the act of listening upon a circuit with the seventh back cord to answer a subscriber's call. Upon connecting the calling subscriber with the desired party, she must wait for a clearing-out signal to know when to take down the connection.

Fig. 2 is a view of the keyboard raised into position to display the wiring. As in usual practice, the keyboard form contains the 20 pairs of wires to the 10 pairs of cords, 10 pairs of wires to the 10 clearing out drops, a pair of wires to the operators telephone and a pair of leads to the signal battery or generator. The novelty is therefore confined to the method of strap wiring between the keys.

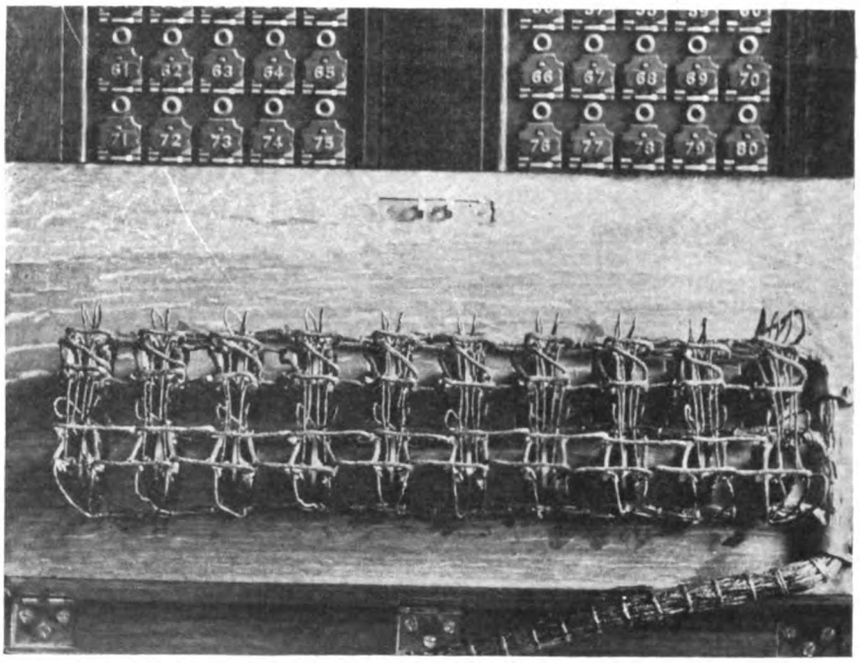

Fig. 2. Keyboard Wiring. The listening key terminals are shown in the upper row.

Fig. 3 shows the complete circuit for a single pair of cords, and Fig. 4 illustrates the method of wiring the operator's telephone circuit to the listening-keys. These diagrams show typically the horizontal form of keys, but in the vertical type the switching of the contacts is exactly the same.

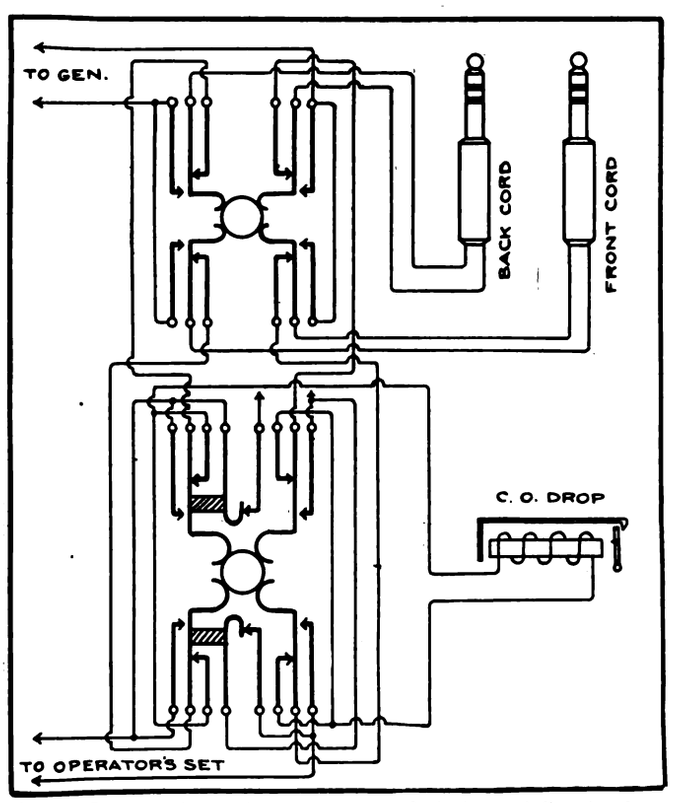

Fig. 3. Cord circuit showing arrangement of ringing and listening keys.

Without the use of reference letters, it may be seen by tracing the circuits in Fig. 3 that the front and back cords are normally connected together. It will also be at once apparent that when the listening-key is moved into position to listen on either cord, the circuit is opened toward the other. By this arrangement the operator is prevented from listening simultaneously upon the two cords of a pair, and is consequently prevented from listening simultaneously on two subscribers' lines connected thereby.

Secrecy would not be complete, however, if the operator's telephone circuit was wired to the listening keys in the usual manner, as it would still be possible for her to connect two subscribers' lines by using two cords of different pairs and moving the corresponding two listening-keys into listening position, and thus overhear the conversation. It may, therefore, be explained in this connection that the method of wiring the operator's circuit as shown in Fig. 4 is to prevent listening on two cord circuits at the same time. One side of the operator's circuit to each succeeding listening-key passes out through a normally closed pair of contacts on each preceding key. A pair of these contacts is separated when any one of the keys is moved into listening position, thus opening one side of the operator's circuit to the next succeeding key. The operator, therefore, cannot listen simultaneously on two listening-keys. In Fig. 4 the two normally closed contacts referred to are mounted inside of all of the other

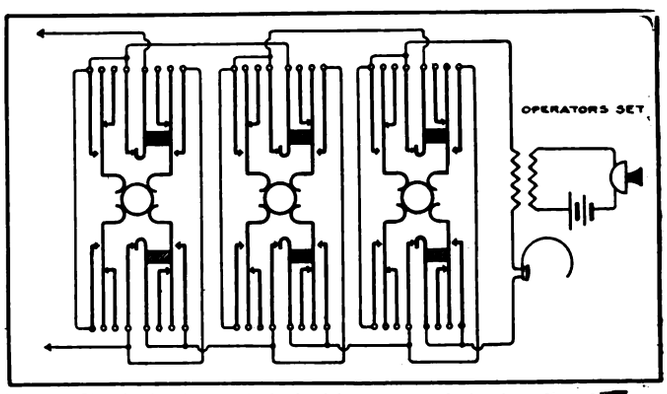

Fig. 4. Circuit showing method of wiring operators' circuit to listening keys.

contacts. For the sake of clearness, all other wiring is omitted in this drawing, and the method of wiring the operator's circuit to three of the listening-keys shown. The arrangement of the contacts on the vertical type of keys is especially favorable to this method of strap wiring, as obvious in Fig. 2.

It will readily be clear to engineers how the circuits described may be applied in common battery systems. In such exchanges it is evident that the best results of operation would be obtained. The success, however, which is experienced in the operation of the switchboard here described proves that satisfactory results may also be had in the magneto exchanges.

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The Railway Telephone Service; Cost of Line Construction*

By Frank F. Fowle.

CABLES have been proposed with conductors insulated with rubber and then wrapped with paper; the advantages of this consist only in the advantages of rubber as an insulator, for the capacity will be practically that of conductors with insulation wholly of rubber. Cables have been proposed with the above arrangement reversed—the paper being applied first and then covered with rubber; such a cable will be more expensive than a paper cable, for a given efficiency. The capacity will be intermediate between that of a rubber cable and that of a paper cable. One of the advantages of the paper cable is that it may be laid up loosely, thus admitting air in the loose wrappings of paper and making the capacity even lower than a tightly laid up paper cable. It will be difficult to apply rubber insulation over the paper without compressing it and excluding the air.

Telephone cables are constructed in twisted pairs to avoid cross-talk; the length of twist varies from 3 to 6 inches. There is practically no additional cost over straight wire cables and they are equally efficient, with the advantage that conductors may be used as straight single wire circuits or as twisted metallic circuits.

The following table gives the mileage of No. 8 B. W. G. open wire cirucit which is equivalent to one mile of circuits of various gauges in paper cables of ordinary construction:

Cable Conductors. Gauge B. & S.	Mutual Capacity.	Miles of No. 8 B. W. G. which are equivalent to one mile of cable.
22	.069 mf.	45.6 miles
19	.054	28.5 "
16	.065	22.2 "
13	.065	15.7 "
10	.090	13.0 "

The cost of cables varies with a large number of conditions, but the following table shows the average cost of cables whose equivalents are given above—in dollars per foot:

Number of pairs.	B. & S. Gauge. No. 22	19	16	13	10
5	.037	.059	.073	.115	.148
10	.054	.083	.109	.175	.239
15	.061	.10	.139	.231	.331
20	.072	.12			
25	.083	.135	.194	.338	.492
30	.094	.15			
40	.109	.179	.273	.483	.734
50	.128	.21			

Thickness of sheath 1-12".

The choice of the cable of the most economical efficiency in a given case depends on the standard of transmission, the length of open wire line, the length of cable and the number of circuits. In any given case there is a particular gauge of line wire, taken in conjunction with a particular gauge and capacity of cable, which will give the desired transmission at the least cost. The cost per circuit, for both open wire lines and cables, diminishes as the number of circuits increases.

This question of the selection of the most economical gauge of cable aplies equally to bridle, office, and switchboard cables; for example, the use of No. 22 B. & S. switchboard cable, in a line designed to talk 1,000 miles, is a very expensive proposition, because the same transmission could be secured with smaller line wire and larger cable, at less cost. As a general rule in cases where the burden of cost is in the open wire line, it is economy to use large gauge cables unless the cables are exceedingly short.

The terminal switchboard arrangements are also very important in their bearing on the efficiency of transmission. Petty savings on switchboard equipment are usually obtained at the sacrifice of efficiency, and it is very important to determine that the terminal talking circuits and apparatus are adapted to the line. A comparatively small investment in securing ample transmitter-battery power will improve transmission to the same extent that many times this investment, in increasing the size of the line wires, will improve it.

Simultaneous Use of Circuits for Telephony and Telegraphy.

There is very great economy in the simultaneous use of trunk lines for telephony and telegraphy. There are two systems in common use, the composite system and the symplex system; the former secures two telegraph circuits from one metallic telephone circuit and the latter only one telegraph circuit. The joint use is secured by introducing certain apparatus at the terminals, the character of which is generally well known. The insertion of this apparatus impairs the line efficiency and joint use is not economy beyond the point where the investment in increasing the size of the line wires, to offset the loss of efficiency at the terminals, exceeds the cost of an additional circuit.

One terminal set of standard composite apparatus impairs transmission to the same extent as the introduction of approximately 1.25 miles of No. 19 B. & S. gauge cable or 35.6 miles of No. 8 B. W. G. open line. The effect of two terminal sets would be equal to 71.2 miles of No. 8 B. W. G. Therefore it is economy to composite only long trunk lines without many intermediate telephone or telegraph stations.

In illustration of this, take the case of compositing a telephone line of No. 8 B. W. G. copper as compared with two No. 8 B. W. G. iron telegraph wires. The first cost of each circuit is given below, on the assumption that pin space is available on an existing line:

Cost of Metallic Circuit of No. 8 B. W. G. Copper.			
870 lbs. Copper,	at $	.15 per lb.	$130.50
80 pins,	"	.01 each	.80
80 insulators,	"	.02 "	1.60
80 tie wires,	"	.025 "	2.00
10 sleeves,	"	.035 "	.35
Labor,	"	10.00 per mile	10.00
Total cost per mile			$145.25
Cost of Single Wire Circuit of No. 8 B. W. G. Iron.			
378 lbs. Iron,	at $	.034 per lb.	$13.23
40 pins,	"	.01 each	.40
40 insulators,	"	.02 "	.80
40 tie wires,	"	.005 "	.20
Labor,	"	5.00 per mile	5.00
Total cost per mile			$19.63

The total annual charge on each circuit is computed as follows:

*Second article of paper read before Association of Railway Telegraph Superintendents at Chattanooga, Tenn., May 17, 1905. Copyright 1905 by Frank F. Fowle.

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on the basis of 4 per cent. interest, 50-year useful life of copper wire and 15-year of iron; the annual cost of maintenance being principally the cost of labor, it is taken as $1.00 per mile of wire.

Annual Cost of Metallic Circuit of No. 8 B. W. G. Copper.		
Interest	at 4%	$5.81
Depreciation	" 2%	2.91
Maintenance	" $1.00 per mile of wire	2.00
Taxes	" 1%	1.45
Total Annual Charge		$12.17
Annual Cost of Single Wire Circuit of No. 8 B. W. G. Iron.		
Interest	at 4%	$ .79
Depreciation	" 6.7%	1.32
Maintenance	" $1.00 per mile of wire	1.00
Taxes	" 1%	.20
Total Annual Charge		$3.31

The annual charge on the telephone circuit must increase $6.62 per mile on account of compositing the circuit, before it is economy to string two separate telegraph wires, and work the telephone circuit uncomposited. This resolves itself into a question of the distance between telegraph stations. An increase of $6.62 in the annual charge on the telephone circuit may be regarded as the interest, depreciation and taxes at 7% on the additional copper—needed to maintain the efficiency of the telephone circuit. This amount capitalized is $94.57 and will pay for 630 lbs. of additional copper—or a 750 lb. wire instead of a 435 lb.

In designing a 1,200 mile line, on the 1,200 mile standard, it would be economy to introduce not more than six composited sections; giving telegraph service thereby, between the two terminals and five intermediate telegraph offices. The economy of the composite is less apparent with a better standard of transmission; but the economy on short-haul circuits, of less cost, is more apparent. The efficiency of the composite from a telephone standpoint exceeds the efficiency from a telegraph standpoint, for a telegraph circuit through twelve composite sets would not be satisfactory. The composite system is limited by the fact that an intermediate telephone station requires the same composite apparatus that is required at an intermediate telegraph station. Ringing over such circuits is accomplished by the use of special high frequency ringers. The question of economy may be summed up in the statement that the composite system is best adapted to circuits of moderate or great length, on which the telephone traffic and the telegraph traffic are of a through nature, or direct business between terminals.

(*To be continued.*)

The Application of Iron Wire Ballasts to Telephone Circuits and Apparatus

By C. D. Engchs.

It may prove interesting to the telephone world in general to learn the results of some applications of the well-known principles of iron wire ballast in telephone circuits.

The most familiar use of this type of ballast is the case of the Nernst lamp. Here the ballast is used as protection against upward fluctuations of voltage on the line burning out the filament. In this type of ballast the wire is used in the form of small spirals supported between porcelain discs. The radiation is thus reduced to a minimum with respect to the supporting mechanism.

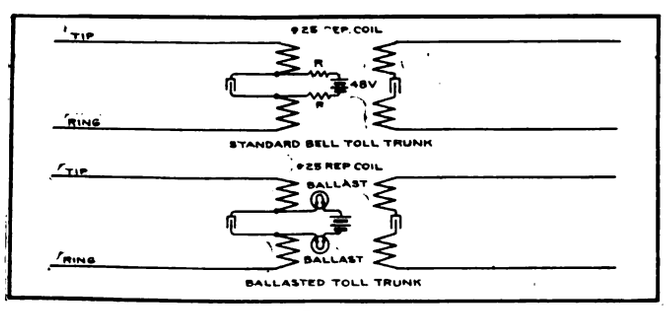

Fig. 1.

It is found best in such experiments to use an inert gas in the lamp bulb, so that the filament can respond more quickly to changes in temperature. With the Nernst lamp the variation in voltage is so slight that the increase in resistance of the wire is not more than 100 per cent.

It is an established fact that the resistance of iron wire may be increased from 800 to 1,000 per cent. by means of the heat due to an additional current passing through it. Even if the wire is supported, as is the case in the Nernst lamp ballast, it will collapse from its own weight at the high temperature necessary to bring about this heavy rise in resistance. It is obvious, then, that to take advantage of the fullest possible variation in resistance, this method of mounting must be modified.

The experiments performed with iron wire ballasts in telephone circuits are tabulated as follows: First—To apply the ballast in a cord circuit and boost the central office battery to such an extent that the transmitters on long subscribers' lines would receive practically normal current. The ballast then to be depended upon to protect the transmitters from excessive current when the cord was placed in the jack of subscribers' lines having a low ohmic resistance. Second—To apply the ballast directly in the line circuit in series with the lamp, thus obviating the use of the line relay. Third—To place the ballast in series with a relay or other piece of mechanism, so designed

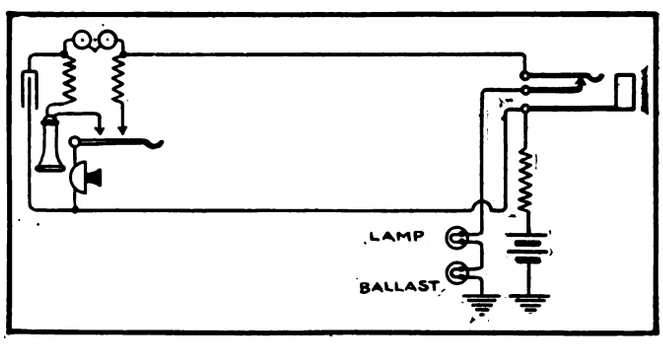

Fig. 2.

that when the circuit was first closed the piece of apparatus would perform one function, but when the ballast heated, the extra resistance introduced would cause the piece of apparatus to perform a second function. Fourth—To place the ballast in the operator's individual ringing mains in place of the lamp ordinarily used.

In the first experiment it required only the selection of a wire of proper size to be heated by the current flowing through the transmitter, when the transmitter was working at its maximum efficiency. Take, for instance, the ordinary Bell toll trunk circuit, as per Fig. 1. In this case the resistance (*R*) is placed in the cord circuit to protect the transmitters on short subscribers' loops. This resistance is 40 ohms on each side of the repeating coil. In designing the ballast to replace this resistance, what is needed is a wire which will heat when the subscribers' line is

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less than 80 ohms loop resistance. The resistance of the wire must disappear on all lines having more than 80 ohms loop resistance, and must appear in proportion as needed on all shorter lines. This is accomplished with No. 39 steel wire sealed in a vacuum. The improvements in the transmission of this circuit over the Bell are shown in the lower part of Fig. 1.

In the second experiment, in placing the ballast directly in series with the line lamp, two things must be considered: First, a lamp that will have good mechanical and electrical properties. Second, a wire large enough to be mechanically strong. The result of these conclusions was a combination of a lamp taking from .07 to .11 amperes and a steel wire .001 inches in diameter. This circuit allowed the operation of a lamp directly in the line, on lines varying from 0 to 400 ohms in resistance, as shown in Fig. 2.

In the third experiment Fig. 3 shows a ballast in circuit with a relay to produce the effect of a "passing circuit," without the objectionable introduction of the passing contact itself. The wire

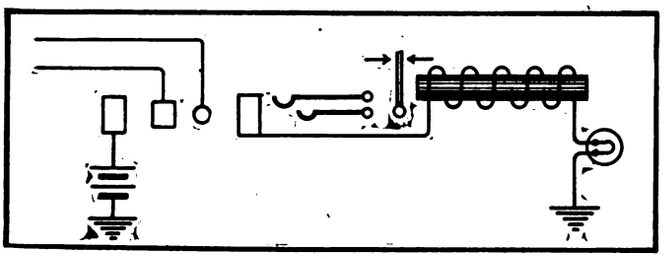

Fig. 3.

is so designed that the relay will operate when the circuit is first closed. When the wire heats up to its full resistance the relay falls back, thus producing the actual effect of a passing contact, although the primary circuit has been continually closed.

In the fourth experiment the ordinary operators ringing circuit is supplied with a resistance lamp to protect the machine from short circuiting in case the operator rings on a grounded or short circuited line. Without this lamp, if one of the operators rang a short circuited line, all of the other operators in the exchange would be robbed of their ringing voltage. It is evident that this resistance in circuit with the operator's ringing leads, is a direct loss in all cases, except where the operator is ringing on such short circuited lines. An ideal protection would be a resistance which does not appear under normal conditions, but which appears instantly, when the machine is short circuited by the act of the operator ringing.

The iron wire ballast is precisely such a resistance, and the only development required in this case is to select the size of wire needed to "operate" when the ringing current is thrown upon a short circuited line. This idea is shown in detail in Fig. 4.

Among the interesting features which appeared in this line of experiments was the development of the method of mounting the iron wire. The method employed in the Nernst lamp was discarded because it did not allow the wire to heat to a sufficient temperature. The next idea was to wind the wire around a mica vane. The movement of the wire, however, through its expansion under heat, was sufficient to cause the mica vane to cut the wire at the points of support in too short a time to allow a commercial length of life.

A scheme determined upon, leaving little to be desired, consisted in winding the wire around a threaded glass tube having thin walls.

The threading of the glass is a difficult operation experimentally. It can be accomplished in the following manner: The glass tube is first wound with a certain number of turns to the inch, using a No. 22 copper wire. The tube thus wound is dipped in beeswax. When the wax has cooled, the wire is unwound, leaving an exposed thread of clear glass in the surface

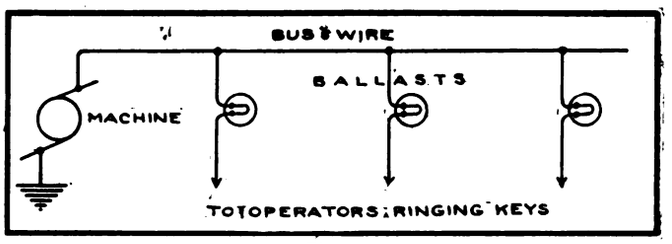

Fig. 4.

of the wax. The tube is then dipped in hydrofluoric acid and a deep thread etched. The wax being removed, the iron wire is wound in the thread thus formed. The tube is then sealed in an ordinary glass bulb, and a good vacuum established.

The result is a ballast which heats and cools readily, and which has practically an unlimited length of life. There is a certain discharge of iron corpuscles from the heated wire carrying the electric current. This is common to all heated filaments; but in the case of the ballast is not sufficient to cause appreciable deterioration, although it soon causes a certain blackening on the supporting tube.

The conclusion reached by such experiments seems to be that iron wire ballasts are destined to play an important part in telephony of the future. A board has been designed which will operate almost entirely on these principles. The circuits as designed have no contacts either in the line or in the supervisory circuit. The only contacts made are those at the switch hook at the subscriber's station, and the contact of the operator's plug and the line jack.

Local Exchange Management

By H. P. Story.

THE duties of the local manager do not consist, as some believe, in his being a good wire chief, an expert trouble man, a chief operator or an installer of merit. Instead he should be a resourceful business man with a fair working knowledge of the duties of his subordinates.

An excellent suggestion for any manager is for him to be the possessor of the motto, "Good and uniform service," and for him to ever strive for its attainment for his subscribers. The revenues of any company come from the subscribers, who pay the bills, and they are, therefore, the ones to be satisfied. They should be made to feel by constant and cheerful attention from the operators, that there is a direct personal interest in getting the desired connection for them. Ninety per cent. of the telephone public are of this opinion as it is, and neither know nor care anything about the hundreds of other calls that are being made and answered at the same time.

There are three important factors of good operating which the wise manager will instill deep into the methods of his subordinates, and which will do much to keep the subscriber pleased with the service. They are "Promptness," "Courtesy," "Accuracy."

Promptness in making connections and disconnections is an absolute necessity, as seconds lengthen into minutes when one is at the telephone awaiting the operator's reply, or the faint "Hello" from the other end of the line.

Courtesy in all dealings with the public and with each other is equally as important. Remember that "A soft answer turneth away wrath."

Accuracy in all things, especially in handling connections, reports and complaints from subscribers, one might say is the mainstay of the business. All complaints of irregularities in the service or maintenance of apparatus should be handled upon the basis that they are justified, and should where possible have the personal attention of the manager. It is the manager's duty to see that every phase of a complaint is considered, and that every detail is thoroughly investigated before it is set aside.

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When the trouble is remedied the manager should notify the complaining subscriber and explain, in not too technical terms, the nature of the case, thank him for bringing it to his knowledge, and request him to promptly report any recurrence of any trouble in the future. The subscriber is, on the whole, the "touchiest" man in the country; the slightest hint of inattention or discourtesy on the part of an operator, a careless piece of work by an installer, or the untactful remark of a collector will in a few minutes make a lasting enemy of him.

I recall a story which illustrates this point to a good advantage. A Western telephone company had among its list of subscribers a professional man who always seemed to have an "ax to grind." He complained about the operators being slow and discourteous, about his bell not ringing, and had "kicked" so diligently that he had long been classed with the "chronics." Everything within reason had been done to placate him, but without avail. At last a note was received by the local manager in which the subscriber in strong terms ordered his telephone removed. The manager called upon him and found that the source of all the trouble dated back to some ten years previous, when a careless installer had dropped a hammer upon a mahogany table in the office of the subscriber. Although at the time of the occurrence the table had been refinished at the expense of the company, the "casus belli" had been given, and all the errors which occurred from that time and some which did not, were greatly magnified. This, although exceptional, illustrates the principle that if any subscriber is given the chance to complain of any part of the service, he will find the whole system at fault and never neglect to say so.

Two features of good service, without which the best operating methods are useless, are the standard of service and the operator's load. The load should be equally distributed over the various operators' positions in accordance with the results of a number of peg counts. No attempt should be made to distribute the load from the record of one or two counts, but adjustment of the record should be made from the results of a number covering several busy days. In adjusting the operator's load through the medium of the distributing frame, the following points should be kept in mind. The load should be so adjusted that it will meet the requirements of the "busy hour" instead of the total traffic for the day, as it is during the "busy hour" that the operating force and the apparatus is put to the severest strain.

One operator's position may be underloaded and the character of the service suffer as much in consequence as it would were the position overloaded. It is a well-known fact that the service is of a higher grade and the operator more efficient when she is given a load heavy enough to keep her comfortably busy and her time fully occupied. The load should not be distributed with any regard to the efficiency of any individual operator—giving an efficient operator a heavy load and vice versa, but should be equally distributed over all the switchboard positions, with the efficient operators scattered among the less efficient ones. In this way those more proficient can assist by answering calls on the contiguous positions. "Team work" is essential for good operating on a multiple switchboard. An operator can devote her entire attention to one call and thus give better service when she knows that any other call originating on her position will be taken care of. It is the manager's duty to see that constant service tests are made, in fact some part of the traffic should be under observation at all times. All irregularities and slow answers should be pointed out to the operator causing them. Listening tests should also be made at frequent intervals by bridging in on the operator's receiving circuit, and the operators rated according to the results shown.

The manager is placed in his position by the company as the guardian of its interest, and he should see that nothing occurs for which he is responsible, which would be detrimental to those interests. He should see that the expense accounts of those under him are kept as low as possible, that all accidents or unusual occurrences are promptly reported to his superiors, and that the spirit of co-operation exists between those under him and between himself and his fellow managers.

The manager should not wait for his superiors to come around and point out to him something that needs attention, but should originate ideas for himself. He should not allow his mind to become clogged with a host of minor details, but should keep always before him the goal for which he is striving.

Carrying Cables on Brooklyn Bridge

By Frederic D. Bond.

SINCE the removal of the New York Telephone Company's cables from the Brooklyn Bridge, the reasons impelling the corporation to this step have gradually become public. According to A. McLean, Chief Engineer of the Bridge Department of New York City, the cables were first suspended from suspension wires in the usual manner. In all, there were 1,500 twisted

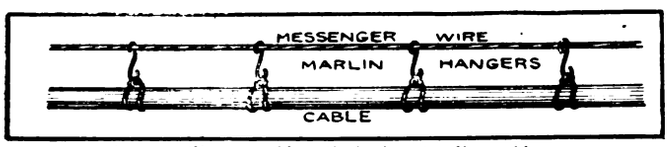

Fig. 1. Showing old method of suspending cables.

pairs enclosed somewhat irregularly in six cables. The cables were of lead and each pair was paper insulated. During the period when this system of carrying the telephone wires was in force, the trouble department was constantly occupied. It was found that the incessant vibratory motion of the structure caused repeated crackings of the lead sheath. Moisture would be absorbed by the paper insulations of the twisted pairs and the circuits would become noisy.

Several plans to remedy this state of matters having proven unsuccessful, the engineering department of the telephone company decided on an entirely new way of carrying the cables. A series of wooden beams was grooved lengthwise and three cables were laid in as many depressions. Two cables were then laid in the spaces between the three bottommost, while a sixth cable was then placed in the trench between the fourth and fifth. The whole arrangement was like that used in piling up cannon shot. The diagrams, Figs. 1 and 2, give a graphic view of both the old and the new method.

Experience showed that this plan worked successfully. The

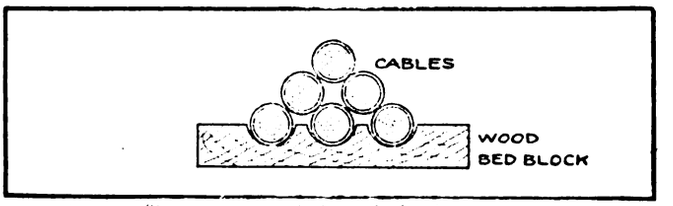

Fig. 2. Showing new method, employing beams as supports.

vibrations of the bridge were no longer injuriously communicated to the cables, and consequently the lead sheath was no longer broken or cracked. Perhaps the cables would still be carried on the bridge but for another difficulty the company experienced of a very different nature. It appears that the City of Greater New York taxed the corporation for each twisted pair thirty dollars annually, or $30,000 for the entire cable system in the Bridge. The upshot of the matter was that the Company found it cheaper to lay submarine cables across the bed of the East River. It removed the ones that had been carried across on the bridge sometime ago, and is carrying the circuits under the water. The only telephone wires now crossing the bridge are a few official city lines.

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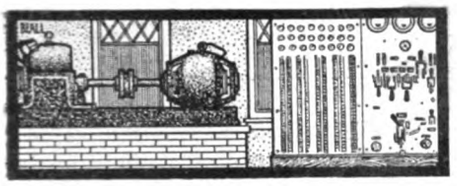
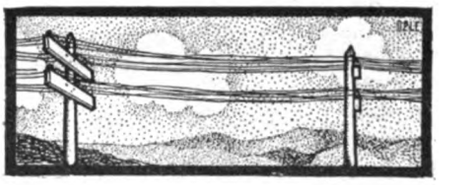


QUERIES

Questions on any subject relating to telephony will be answered on this page.



BUSY TEST CIRCUIT.—(595.)

Please give me through THE AMERICAN TELEPHONE JOURNAL a description of a busy test as used on a multiple board. M. C. C.

Fig. 595 shows the circuit of a multiple switchboard busy test. Here a line circuit is shown "busy" by having a cord connected with its multiple jack at the second section while an operator is testing its multiple jack in the first section. The presence of the plug in the jack at the second section puts battery potential on all of the jack sleeves of this line as current is flowing from battery A^1 through the sleeve calling relay, sleeve of line, cut off relay to ground and thence back, to battery. When the operator at section one tests, by touching the tip of her calling plug to the sleeve of the jack, a small flood of current is diverted through the tip of her cord, back contact of sleeve relay, high resistance winding of test relay to ground and thence back to battery. The test relay operates, closing a circuit from battery A through the 200-ohm retardation coil, primary of induction coil, test relay contact to ground side of battery.

This flow of current in the primary of the operator's induction coil induces a flow in the secondary and thereby causes a click in her head receiver, the regular listening key being thrown so as to complete this secondary circuit. The high resistance and impedance of the test relay prevents the drawing of too much current from the circuit undergoing test, otherwise there would be loud clicks on the busy circuit when testing, which would interfere with the service. It will be seen from the circuit that normally the sleeves of all multiple jacks have no battery potential when the line circuit is not in use, therefore the test relay would not be operated should a test then be made, and the absence of a click in the operator's head receiver would signify a non-busy line.

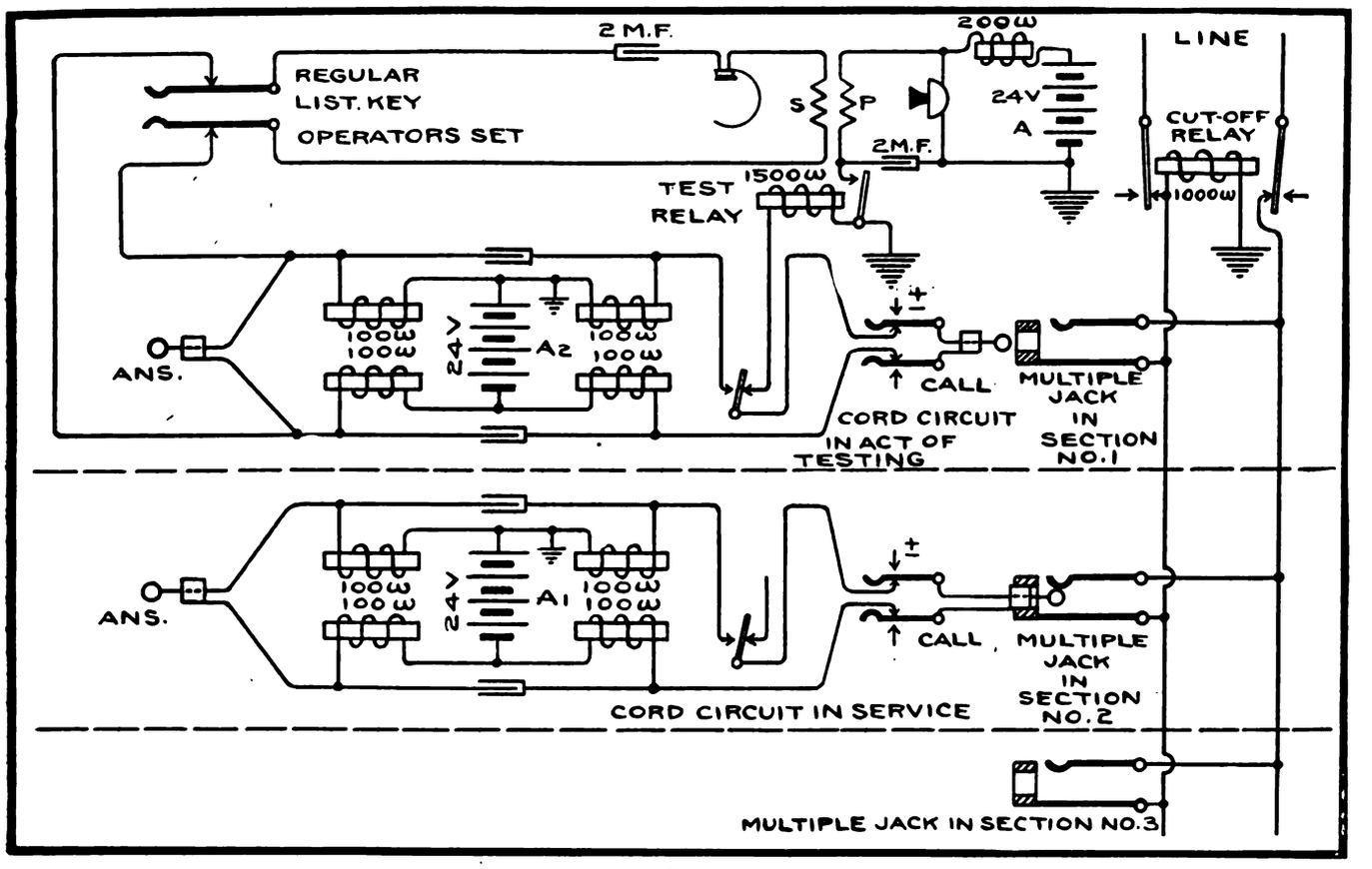


Fig. 595.

TROUBLE TO RING.—(596.)

On a long county line we have bridged sixteen telephones. Recently we made the line metallic and placed push buttons in all the instruments so that when the exchange was desired a subscriber pushed the buttton, but if another party on the line was wanted he simply rang without moving the button at all. Before the change was made we had no trouble, but since it is frequently impossible to call the exchange. What might the trouble be?

S. C. T. & Co.

The trouble would appear to be in the connections and adjustment of the drops in the exchange. It is quite likely in making the change that you have not soldered the wires and terminals. Possibly you may have a loose connection within the coil. This could very readily be caused by overheating in soldering to the terminals. To test it; disconnect it from the switchboard circuits and apply generator current to see if the circuit is closed through the winding. While current is passing through tap it to see if there is a loose connection. If there is the armature will buzz intermittently. See that the adjustment is correct and that the shutter falls readily. The trouble may also occur at the the instruments. Examine all the connections carefully, and also the contact points of the push buttons. Look over the ground wires and be sure that they are attached tightly to the rods or whatever you use for that purpose. Also examine the ground connection of the drops in the exchange.

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THE EDITOR'S PAGE

A PECULIAR CASE OF HIGHER CAPACITY.

HEROIC measures have been adopted to free telephone lines of disturbing influences. Yet the amount of static capacity developed in a line strung over a roof is so much greater than when it is supported as a mere pole line that the fancied wisdom of encouraging this practice is found to be sheer ignorance. Although a line passing over a roof is more removed from the earth than one supported on poles, it is actually much nearer in an electrical sense than the one below. The roof is metallic and generally grounded, so that the line passing a few feet above it is bound to develop a greater capacity effect than the typical pole line beneath.

If the capacity effects of a line are very marked, and they may be diagnosed as a lesser volume of sound, some confusion and a general retardation of speech, then, though it may appear strange, a little line leakage is beneficial. It permits the static charges to get away. Theoretically, a telephone line should be far removed by any mass possessing capacity. One wire ought to be far away from the other, and both far away from the earth. The only thing to be done, however, as far as expense is concerned, is to limit expenditure and put up with some of the trouble.

For this reason the wires are placed a certain distance apart on poles not less than twenty-five or thirty feet high. The reduction in capacity which could be secured by using a very small sized wire is another feature that practice will not permit. A certain strength is necessary and a guaranteed serviceability. Avoiding that form of carelessness which leads to disturbances is the best plan. Metallic roofs are simply one instance of where capacity is augmented.

It is not to be inferred from these remarks that capacity effects are very greatly increased by the inductive influence of metal roofs. But it is certainly true that the elimination of such features will add to the general efficiency of speech transmission. It is frequently the lesser evils that, by aggregation, become injurious. When drawbacks to success appear in this guise, their removal, if possible, is imperative. When capacity can be reduced it seems wise to reduce it.

'CROSS COUNTRY LINES.

THE construction of 'cross country lines presents certain features of interest with regard to cost, durability and repairs. A line running along a railroad track is a much simpler proposition than one embracing a comparatively wide and irregular stretch of territory. The topography of any section thus becomes a matter of study, if the success of an installation partly consisting of 'cross country lines is at all assured by an intelligent survey of the situation. Not only is it necessary to consider topographical peculiarities in this respect, but it is doubly important to investigate the extent and severity of the season's changes. Statistics readily show amounts of damage done by wind or snowstorms, that total up to a very heavy bill each year. The breaking of communication between subscribers and the exchange on such occasions as this is one of the heaviest blows a telephone company can suffer. The erection of successful 'cross country lines thus becomes a more important problem than a casual view of the case would seem to indicate.

The difficulties that appear are those relating to the choice of poles in the first place. These must be of such size that whether over hillocks or across vales the pole tops are preserved as nearly level as such conditions will permit. Pole lengths chosen with regard to this idea thus constitute one means of making 'cross country lines a success. The other means employed, is that relating to the insulators, in so far as the method of securing them to the line is concerned. The underlying idea is that of developing an equal strain on all poles and necessarily all insulators when the line is strung. Differences in the height of poles would inevitably cause a strain on the insulators, which under the influence of a strong wind would rapidly disorganize the system. Either an upward or a downward pull on the poles is, as far as the line is concerned, proof positive of future injury. There is an art in building 'cross country lines which has arisen through observation and experience of a high order. The degree to which this art is exhibited is made manifest during stormy periods. Too much economy and unintelligent and hasty construction only pave the way for greater evils. These are only too well known as interrupted service and constant repairs.

CONDUCTORS.

BOTH the city and country make different demands upon the qualities of conductors. The amount of noxious gases released within city limits have a marked effect upon the conductors exposed to them. Cities near the sea coast present another proposition. The salty air has a deteriorating influence upon insulation as well as the bare conductor. According to some authorities, copper is unaffected by the deleterious effects of the foreign gases and briny touch of the sea. But iron or steel wires are not so lasting. In fact they deteriorate with a certain degree of rapidity in cities near the sea coast, and in those cities, whose vapors are particularly destructive, they last only a short while. It is a strange fact that what the human lungs will stand with comparative impunity, will cause the destruction of telephone lines almost from the first few months of their installation. It is also surprising to realize how the change takes place in this same, breathable, city air. A galvanized iron wire would seem to be particularly well protected against these causes of deterioration, but it is a fact that in a very short time the zinc is eaten away, and then the destruction of the wire is rapidly hastened. According to some records of iron wires strung within city limits, their life was less than two years. In one particular instance, a well galvanized iron wire, when examined at the end of a year, was found to be simply a mass of rust at several places in its length. So fundamental a necessity, as the establishment of a durable line, is obviously indispensable in telephone practice. The additional cost of installation, even though a little higher than customary, can never outweigh the losses arising through interruptions due to repairs.

The lesson to be drawn from these facts is the lesson of dear cheapness. The copper wire, hard drawn, shows a durable period of over ten years and then will be found on examination to be very strong and reliable. The coating which forms over it is protective in every sense of the word. It consists of a skin of carbonate or chloride of copper, which makes the underlying tissue of copper exempt from further deterioration. Copper or bronze conductors are the most durable wires that can be employed in telephone service. Once installed they are useful for many years. It is in this respect that an investment in those cities where underground installations are not compulsory, will pay its best dividends, the dividends of reliability and good service.

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The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

VALUE OF TOLL CONTRACTS.

There is a matter in connection with toll contracts that some Independent telephone companies are entering into with the American Telephone and Telegraph Company's sub-licensee companies that I have never seen commented upon in any telephone journal.

I would like to know the value, if any exists, of a contract under the following conditions:

An Ohio Independent telephone company has entered into a toll contract with the Central Union Telephone Company for a period of 30 years, and purchased the entire equipment of said Central Union Telephone Company in their county.

Now suppose the Central Union Telephone Company is fortunate in securing contracts with a fair percentage of Independent telephone companies, and purchase outright those with whom they cannot contract for toll connection in their territory, but are willing to sell, how long will it be before the United States Telephone Company will become discouraged and turn over a controlling interest to the American Telephone and Telegraph Company? Then what is to deter the Central Union Telephone Company from going into the hands of a receiver, and its property being sold at public sale, thereby abrogating all contracts at a time that the American Telephone and Telegraph Company considers advantageous? In this event, and it now seems to be the American Telephone and Telegraph Company's game, what will the Independent 30-year toll contract holders say when the American Telephone and Telegraph Company informs them that they have no contract and that they will construct their own lines and exchanges which, as I see it, will be quite the natural procedure for the American Telephone and Telegraph Company? Will they not be ready to accept any price that the American Telephone and Telegraph Company is willing to pay for that property, in view of the fact that there are no long distance lines with which to connect, that their equipment has deteriorated, that their neighbors have sold out, or are ready to do so, and all owing to their own folly in breaking faith with their true friends, and becoming traitors.

Now, as I understand the situation, an Independent telephone company cannot make a long term binding toll contract with the American Telephone and Telegraph Company, or any sub-licensee company, that is in good physical and financial condition.

I would be pleased to have this matter commented upon in your next issue if possible, or a reply by mail. W. R. F.

THE value of a contract under the conditions that you state would not be very great, provided the matter worked out in the way that you surmise. The plan you mention could certainly be carried out if the men connected therewith were unscrupulous enough to do so. The contract would, of course, have a value until the contingency you suggest arose. The matter seems to the editor rather speculative, and the risk that the Independent company is taking is the same risk that any person takes in entering into a contract of any kind, namely, that the other party will break the contract or will die before it is completed. The Independent company would have a right of action for damages against the company or the receiver as soon as the contract is broken, but this right would not be very valuable against a corporation that was in the hands of a receiver.

RESTRICTION ON USE OF WIRES.

To what extent can a telephone company restrict the use of wires by its subscribers? Can it interfere at all with the communications sent over its lines? J. B. S.

THE Bell Telephone Company was carrying on the business of executing orders by telephone for messenger boys, cabs and the like, which it sold to the Electric Dispatch Company, agreeing among other things not to transmit in any manner any of such orders to other persons than the electric company. Another company afterwards established a messenger service for the purpose of which the wires of the telephone company were used. The electric company brought suit for the breach of the telephone company's agreement with it and for an injunction to restrain the telephone company from allowing its wires to be used for giving orders for messengers.

The court held that the telephone company, being ignorant of the nature of the communications sent over its wires by subscribers, did not transmit such orders within the meaning of the agreement; that the use of the wires by subscribers could not be restricted and that the telephone company was under no obligation to take measures to ascertain the nature of all communications. The suit was therefore dismissed and the injunction refused. Electric Dispatch Company, vs. Bell Telephone Company, 20 Con. Sup. Ct., 83. A telephone company may, however, promulgate a rule against the use of profane language over its lines. Such a rule is reasonable and may be enforced by refusing further service in case of its non-observance. Pugh vs. Assn., 1, Am. El. Cases 471.

REASONABLENESS OF A REGULATION.

Can you advise us whether a regulation is valid which forbids the use of a telephone to call messengers not in the employ of the telephone company? M. T.

A REGULATION is unreasonable and void which forbids the use of a telephone to call messengers not in the employ of the telephone company.

LEASING THE USE OF TELEPHONE POLES.

The Borough of Washington, Pa., has entered suit against us for operating a pair of wires in said borough. We entered the borough by a lease on the poles of the National Transit Company. The Transit Company has telegraph and telephone lines for its own use. We did not set a pole or otherwise interfere with the streets.

Can you supply us with the record of any case similar to this? Our attorney has requested us to get this information and we hope that you can aid us in the matter. As our case comes up very shortly we would ask you to reply by mail or refer us to such matter that may have been printed in The American Telephone Journal. S. M. T. Co.

IT is the general rule that the granting of a franchise of a public nature is personal to the grantee, and cannot be alienated without the consent of the government that granted it. Under this rule one telephone company would not have the right to lease its lines to another company without the consent of the governmental authority from which the granting company obtained its right to use the streets of the city. It is upon this rule, no doubt, that the action against your company is based. While we know of no case exactly in point, the courts of Michigan and Wisconsin hold the sale and transfer of a franchise by a telephone company to be valid, the court pointing out that if the right to sell a franchise does not exist, mortgages and bonds executed by the company are valueless. Michigan Telephone Co. v. St. Joseph, 121 Mich. 502; Badger Telephone Co. v. Telephone Co., 97 N. W. 907. A clause in a franchise granting permission to a company, "its successors and assigns," makes the franchise assignable in spite of the general rule to the contrary. People v. Central Union Telephone Co., 61 N. E. 428. Under these decisions we think one company could lease its lines to another.

SALE OF CITIZENS' TELEPHONE COMPANY UNRESTRAINED.

THE Citizens' Telephone Company, of Grand Rapids, Mich., has lost its suit against J. H. Palmer and Wolf Bros., of Lake Odessa. The Citizens' Company tried to restrain them from selling the local telephone exchange to the Michigan State Telephone Company, of Detroit, but the courts have held otherwise.

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IN THE OPERATING FIELD.

CONSTITUTION AND BY-LAWS OF THE INDIANA STATE ASSOCIATION BEING DISTRIBUTED.

CHAS. S. NORTON, assistant secretary of the New Long Distance Telephone Company, of Indianapolis, and secretary and treasurer of the Indiana Independent Telephone Association, is mailing the constitution and by-laws of the State association to the Independent telephone companies in all parts of the State. The companies that failed to have representatives at Winona are rapidly coming into the State organization.

EXTENSIVE INDEPENDENT DEVELOPMENT IN MEXICO.

THE city of Torreon, Mexico, is to be made the central point for an extensive system of Independent long distance telephone lines, which are to cover a large portion of the northern part of the country. The concession for this proposed system was obtained from the Mexican government about three years ago by John Woessner, an American resident of Saltillo, Mexico. At present there are two Independent telephone systems in Torreon, each having a large list of subscribers. Both systems were recently improved in many particulars. Long distance lines have been built from Torreon to Gomez, Palacio and Lerdo, and to the more distant city of Durango.

Mr. Woessner says that one of the most important points which he desires to reach with his lines is the city of Monterey, and the matter of extending the system to that place is now under consideration, with every prospect that it will be carried into effect. The distance is about 200 miles. If the negotiations now pending are consummated so as to obtain an entrance into Monterey the work of constructing this line will soon be commenced, and it will be ready for operation in about three months. One of the systems in Torreon is operated in connection with Woessner's long distance lines. Some of the richest country in the Laguna Valley will be embraced in the territory covered by the lines of the long distance telephone system, and the people who live upon these plantations will be placed in direct communication with all of the markets of northern Mexico.

PLANT OF INDEPENDENT COMPANY IN SIOUX CITY READY FOR BUSINESS.

THE Sioux City Telephone Company during the coming week will inaugurate its new system. The construction of the plant, begun about one year ago, is now nearly completed. About 800 telephones have now been installed.

The directory of the Sioux City Telephone Company is composed of some of the leading business men of Sioux City. Not a dollar's worth of stock is held by an outside person. The directors are: F. L. Eaton, president of the Sioux City Stock Yards Company; E. W. Rice, president of the Merchants' National Bank; W. P. Manley, president of the Security National Bank; Howard S. Baker, druggist; T. Arthur Thompson, president of the Iowa Securities Company; D. S. Lewis, mortgage and real estate broker, and George C. Scott, attorney. In addition to the board of directors being local the company has about 100 local stockholders, who represent all branches of business.

With one telephone system in operation in Sioux City by the Iowa Telephone Company the people voted at an election to give a franchise to an Independent company, the vote being 1,691 to 83 against the proposition.

The new exchange building is two stories high and is probably the nearest to a completely fireproof building in Sioux City. No wood whatsoever enters into the original construction of the building, the floors being of concrete and the superstructure of iron.

Besides the main exchange there are two sub-exchanges at Morning Side and Leeds, the electrical power for which is furnished from the central plant.

NEW SUB EXCHANGE ADDED TO PLANT OF HOME CO. AT WHITTIER, CAL.

THROUGHOUT California development of Independent systems has become general. At Whittier the local company, which started business in May, 1904, with 150 telephones, has now upwards of 400 subscribers connected, besides a sub-exchange at Dorney, recently opened, which has upwards of 150 lines.

The switchboard at Dorney is central energy, combined with farmers' lines. It is a two position board. The power equipment consists of a marble power panel, equipped with necessary switches; a Weston voltmeter, reading in divisions of one volt; an ammeter, reading in divisions of 1-10 ampere, and a Ward-Leonard over and under-load circuit breaker. There are two sets of storage batteries, eleven cells each, having a capacity of 24 ampere hours. The charging machines are Holtzer-Cabot 220 volt, 1-6 horse-power. Their speed is 1,800 revolutions per minute, at which they deliver four amperes at a potential of 30 volts for charging. A Warner pole changer is employed for ringing purposes. The line protection is secured through a Cook terminal rack, which is equipped with 400 lines, and has a capacity for 600. No. 44 heat coils are used, with carbon air space protectors. The cable installation consists of three 150-pair cables, mostly aerial. The poles employed are

WANTED—IDEAS

THE results of the call for contributions which has been appearing on the operating field pages for the past two months has been most gratifying. We believed that there were numbers of our readers who had good ideas and only required the suggestion to make them public. Still there are many things being done in secret as it were, which we are certain are of enough importance to become public. These are what we wish to hear about and what our readers wish to know as well. If you have an idea, no matter how simple, it undoubtedly has some value. Send it to our editorial department. Its only necessary qualification is that it must apply to telephone operation. Fiction or poetry is unavailable. Accepted articles will be paid for the 10th of the month following publication.

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round cedar and average in height from 35 to 45 feet. Rates are $2.50 for business, $2 and $1.50 for residences. The radius system is used as a basis for rate charges.

The officers of the company are: L. K. Parks, president; E. W. Bacon, vice-president; P. T. Spencer, secretary; A. Hadley, treasurer, and G. Wardman, manager.

OFFICIAL BULLETIN NO. 2 OF THE NATIONAL-INTERSTATE TELEPHONE ASSOCIATION.

General Headquarters, 708 Electric Building, Cleveland, O.

OFFICE.

All arrangements have been made for collecting and keeping on file complete data in regard to the Independent situation in the various States. Associations and individual companies are asked to respond promptly to requests from this office for information or data, and to refer all inquiries of any kind in regard to telephone matters to this office. All information received by the association, when so requested, will be considered strictly confidential, and will be given out to no one without the consent of the parties furnishing same, and then only after the association is satisfied that the information furnished will not be used in any way that may be detrimental to its interests or the cause of the Independent telephone movement.

STATE ORGANIZATIONS.

INDIANA: A meeting of the Independent telephone interests of Indiana was held at Winona Lake July 12th, and an organization formed under the name of "Indiana Independent Telephone Association." For a further detailed report see THE AMERICAN TELEPHONE JOURNAL *issue of July 29.*

IOWA: On August 10th the Iowa Telephone Association held a meeting and decided to adopt the National-Interstate district plan of organization. District meetings will be announced by the officers of the associations at an early date, and the organizations in the various districts will be perfected in the near future.

ILLINOIS: The Illinois Independents held a meeting at Peoria on August 7th and 8th, and effected a State organization under the name of the "Illinois Independent Telephone Association." A full report of this meeting was given in the August 19th issue of THE AMERICAN TELEPHONE JOURNAL.

COMMITTEE ON LITIGATION AND LEGISLATION.

Hon O. S. Berry, of Carthage, Ill., has been appointed and approved as the fifth member of the above mentioned committee, a vacancy being left by the officers when making up this committee in order to give Illinois representation when the State had been organized. The other members of the committee are: Dwight E. Sapp, Mt. Vernon, Ohio; Edward E. Clement, Washington, D. C.; Breckinridge Jones, St. Louis, Mo.; J. B. Ware, Grand Rapids, Mich.

SUPPLIES, PRICE LIST AND CATALOGUE.

Arrangements have been completed for handling standard toll signs and transparencies, as well as directory covers, stationery, business cards, etc., bearing the official shield, and also various sizes of electrotypes of this emblem. Quite a few orders for some of these supplies have already been filled. Preliminary price list has been prepared and will be sent to any one interested. Complete catalogue is at present in the hands of the printer, and will be ready for distribution within the next ten days. By ordering from us you are sure to get good goods at low prices. Any profits made will be used to help carry on the association work. Address all inquiries to the National-Interstate Telephone Association, 708 Electric Building, Cleveland, Ohio.

MONTHLY BULLETINS.

Independent telephone men in all parts of the country are requested to forward all information regarding the local situation in their respective localities which they think would be of interest in making up these bulletins, and to call the attention of the association to any attacks which may be made in their local papers upon Independent properties or officials in any part of the country. The association will arrange to get the exact facts in the case and publish same in order to correct any wrong impressions due to false or misleading statements which appear from time to time in the daily press.

HOME COMPANY OF SAN DIEGO, CAL., HAS SPENT OVER $120,000.

IN a statement recently filed with the city clerk of San Diego, Cal., the Home Telephone Company shows that during the past eighteen months it has expended more on the construction of its system than required by the franchise in twenty-four months. This sum was $120,000, and the company had until next February to make these expenditures.

The construction work was divided into four periods as follows: By the end of the first eight months, $30,000; by the end of the first twelve months, $30,000; by the end of the first eighteen months, $30,000; by the end of twenty-four months, $30,000. The statement filed for the third period shows that the expenditure was $50,089.67. All of these expenditures have been exclusive of the cost of buildings and real estate.

A toll line is being built from San Bernardino to Santa Ana and then to San Diego. A line already extends from Los Angeles to Santa Ana. Another two months will probably see connection established between San Diego and Los Angeles.

ANOTHER TYPICAL ILLUSTRATION OF BELL METHODS.

SOME years ago the New York & Pennsylvania Telephone & Telegraph Company (Bell) constructed a system in the Pennsylvania towns of Susquehanna, Oakland and Lanesboro, and began business by giving three months free service. Within a short while it had a number of telephones in operation. In the meantime the Susquehanna Telephone & Telegraph Company (Independent) installed a system. It did not give free service, but secured connections with surrounding towns through Independent toll lines. To-day the Bell has less than thirty telephones, while the Independent company has nearly two hundred.

The Bell having found its plant unprofitable, went to the Independent company with a proposition like this: "We have a system here the estimated cost of which is $8,000, and find it not on paying basis. We would like to sell out to you in this manner: we will rent you our system and office for a certain sum providing you will agree to use at the end of a certain time all Bell receivers and transmitters, and agree to use only Bell lines and to give no service to any Independent company." This proposition was voted on at a meeting of the Independent stockholders and rejected. Thereupon the Bell agents stated offhand, that if the local company did not affiliate itself with the Bell the Bell would give free service until it had driven the local company to the wall.

Notwithstanding this threat the Susquehanna Telephone & Telegraph Company seems to have profited by an example furnished them in the neighboring town of Deposit, N. Y. The Deposit (N. Y.) Telephone Company went over to the Bell in a similar manner last winter, and now an Independent company, the Delaware Valley Company, has established an exchange and village system in that town with Independent toll connections.

LIFE OF A MINNESOTA FARMER SAVED BY TELEPHONE.

THAT the telephone is responsible for the saving of the lives of an entire family near Clyde, Minn., is an undisputed fact. It was at the farm of Frank H. Sanders, where he and his wife and six weeks old baby, his mother and his father-in-law were seated at the supper table.

They knew that a storm was approaching, but thought it would amount to nothing more than the average summer thunder storm. Suddenly the telephone rang long and loudly, and Mr. Sanders answered. The call was from his neighbor, A. McConchie, who told him that a funnel-shaped cloud had formed over toward the south and was then driving directly for the Sanders place.

Mr. Sanders called the family, and picking up the baby he dashed out of the house, followed by the others. They sought refuge in a clump of willows a few rods away. Hardly had they reached the trees, where they held on for life, when the cyclone struck the house and in a minute the large brick structure was in ruins.

The barn went next, and with it much hay and grain, and a fine horse was killed. Those who were in the willows escaped injury, except Mrs. Sanders, who had her arm broken. Mr. Sanders says that if they had not been warned by telephone they could not possibly have escaped death or serious injury, as the storm developed so suddenly.

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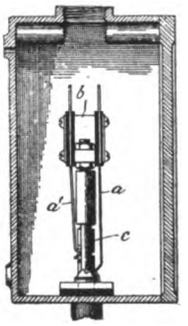
TELEPHONE PATENTS

JACK SWITCH.

Frank R. McBerty, of Evanston, Ill., patents (No. 797,526; dated Aug. 15, 1905; filed Dec. 21, 1903; serial No. 185,921; and assigns by mesne assignments to Western Electric Co., of Chicago, Ill.) a switch.

The invention relates to spring jack switches, so that when employed for telephonic purposes, it cannot be handled except by those duly authorized. Instances of this character arise in



conjunction with telephone lines extending along railroad tracks. In such cases only employees are supposed to operate with the same.

It consists of a case protected switch as shown in the illustration. In this device, two contact springs A A^1 connect to the line, are insulated from each other and mounted on B. The plug is locked and held by means of detents. The switch-plug has a key formed at its tip to engage with the springs thus holding it secure.

AUDIPHONE.

Eugene William Schneider, of New York, N. Y., patents (No. 794,686; dated July 11, 1905; filed March 27, 1905; serial No. 252,288; and assigns by mesne assignments to the Mears Ear Phone Co., of New York, N. Y.) a portable audiphone.

In this invention the mechanism is devoted to the purpose of making the deaf hear. This is accomplished by means of a conveniently constructed microphone transmitter and earpiece in conjunction with a hollow handle containing small cells.

PAPER SPLICING TOOL.

Charles L. Wickham, New York, N. Y., patents (No. 789,193, dated May 9, 1905, filed April 27, 1903, and assigns to the Western Electric Company of Chicago); a tool for splicing together the ends of paper-tape such as is used for cable insulation. The invention consists of two flat parallel jaws, mounted at right angles upon suitable arms pivoted together. The upper surface of the lower jaw is provided with a series of teeth which engage in the upper jaw. In operation the pieces of paper are introduced between the jaws and overlapped. The jaws are then closed, when the teeth cut rectangular tongues in such a way that the tongues formed in one of the pieces of tape will enter the slots formed by the punched out tongues of the other. The splice is then set by simply pulling the ends of the tape, causing the tongues of the one piece to lock firmly in the slots of the other.

ELECTRIC TELEPHONE SWITCH.

George F. Archer, New York, N. Y., patents (No. 790,812; dated May 23, 1905; filed October 15, 1903; serial No. 177,166); a telephone switch. This invention relates to telephone switches, in which certain novel points of construction are presented, for the purpose of showing how contacts are made and broken with great readiness. The point of importance is that of a movable base which is technically called "balanced." When the telephone receiver is off the hook, the base is movable, but according to the specifications, it is so arranged that it will remain in the position to which it is moved until positively moved again. When the plate or base is placed horizontally or vertically, it performs its function in the one case by gravity and in the other by a compensatory influence such as a counterweight, friction or a spring.

SIGNALING SYSTEM.

Clayton E. Frederickson, of Denver, Col., patents (No. 793,578; dated June 27, 1905; filed Aug. 1, 1904; serial No. 219,113; and assigns by mesne assignments one-half interest to Jean F. Webb, Denver, Col.) an electrical signaling system.

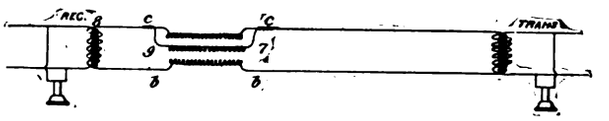
The purpose of this invention is to make selective calls. The idea is to send a signal from one station to any particular one of a number of others in the circuit without interference.

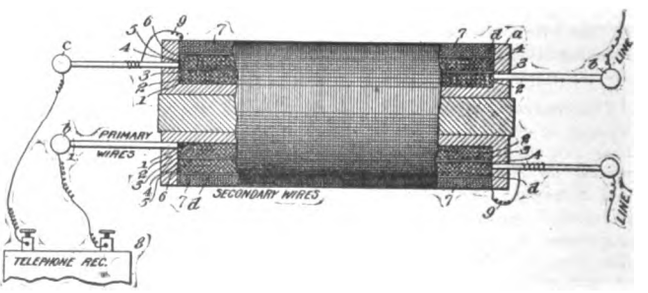
The essential features consist of a rotary spacing disk and cooperative electro mechanical devices for operating the same, an actuating lever and pawl device for turning the spacing disk, which is in its turn actuated by an electro-magnet. When one disk is set to a certain station, the impulses sent over the circuit will only effect a connection with the designated station as indicated in the specifications.

ARRESTER.

Edward C. Paramore, of Philadelphia, Pa., patents (No. 797,015, dated Aug. 15, 1905; filed Dec. 1, 1904; serial No. 235,070) an induction arrester.

By means of this device, the interference arising through the proximity of currents causing inductive action is removed or counteracted. The field extending from contiguous lines, must influence all neighboring lines, to an extent dependent upon the variations taking place in the current carried by them. Where apparatus, sensitive to the secondary current variations, induced in the lines to which it is attached, is to be protected from dis-





turbances of this order, an induction neutralizer may be applied.

It consists of three coils, as shown in the upper illustration. Two are primary, and one is a secondary coil. The secondary is in circuit with one of the primary coils. In this invention, the idea is to have the secondary coil of the same resistance as the line affected by disturbance. In the lower sketch, b and c are contacts receiving the disturbance from the line. Line b connects with the coil and induces equal and opposite currents in the secondary. But as these currents enter at c, the induced currents in the line are thereby neutralized, because of the opposing current waves colliding.

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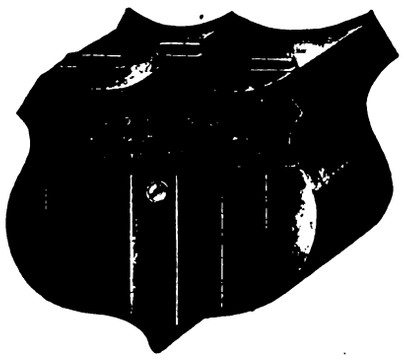


The Station that Gives a Quick and Clear Signal by Simply Depositing the Coin. No Levers to Pull

GRAY

PAY STATIONS

YOURS FOR RAPID SERVICE AND ACCURACY

We Issue an Illustrated Catalogue

GRAY TELEPHONE PAY STATION CO.

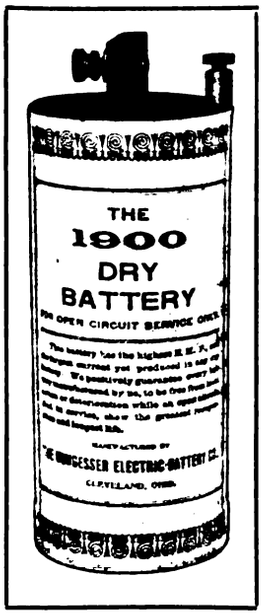
HARTFORD, CONN.

Mfrs. of Automatic Pay Stations and Measured Service Registers

SELLING AGENTS

NORTH ELECTRIC CO., Cleveland, O. STROMBERG-CARLSON, Rochester, N. Y. GEO. W. CONOVER, Chicago, Ill.
STERLING ELECTRIC CO., La Fayette, Ind. EASTERN ELECTRICAL CON. CO., Philadelphia, Pa.

THE 1900 BATTERY



There are some batteries that cost more than the "1900" and some that cost less, yet none give as good results for the same money.

Ask the man who has had experience with batteries about them.

It would pay you to give this battery a thorough trial.

STROMBERG-CARLSON TELEPHONE MANUFACTURING CO.

General Offices, ROCHESTER, N. Y. Branch Office, CHICAGO, ILL.

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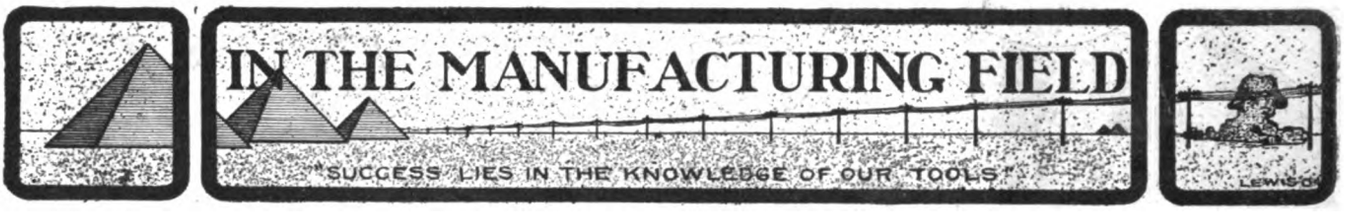

INSTRUMENTS USED TO MEASURE SELF-INDUCTION.

FOR a complete understanding of the principles of self-induction various instruments have been devised which measure it with great accuracy. The accompanying illustrations show two types manufactured by Queen & Company, Philadelphia, Pa.

The variable self-induction standard shown in Fig. 1 consists of two coils of wire, each containing an equal number of turns. One of these coils is fixed, and inside of it the other rotates on its axis.

Fastened to the top of the movable coil is a pointer, which travels over a graduated scale. When the turns of both coils are in the same direction, the instrument has its highest self-induction, and when the inside coil is rotated 180 degrees, thus putting its turns in an opposite way to those of the outer coil, the instrument is set for its minimum self-induction.

Fig. 1. Variable Self-Induction Standard. Manufactured by Queen & Co., Philadelphia, Pa.

The apparatus is very finely made, its woodwork being mahogany and built up to prevent warping. The scale is silvered brass, and all other metal parts are brass, as the presence of any magnetic metal on the instrument would tend to vary the readings in different positions.

The instrument will read from 3.5 to 45 millihenrys.

The parallel cylinder form of variable self-induction standard shown in Fig. 2 is another type of instrument to accomplish the same purpose as the one shown in Fig. 1.

It consists of two cylinders, one the inductive, and the other the non-inductive. When the instrument is set for its maximum self-induction, all the wire is coiled around the inductive cylinder. To decrease the self-induction, the wire is taken off and wound on the non-inductive cylinder. This operation merely requires the turning of a handle on the end of one of the cylinders.

The inductive cylinder is a metal tube split longitudinally, and covered with a grooved hard rubber shell, upon which the wire winds. The non-inductive cylinder is a heavy copper tube deeply grooved. Each turn has a specific self-induction, which can be read directly from the scale at the top of the instrument, and fractions of the self-induction of a turn are indicated by a circular scale on one of the cylinder ends.

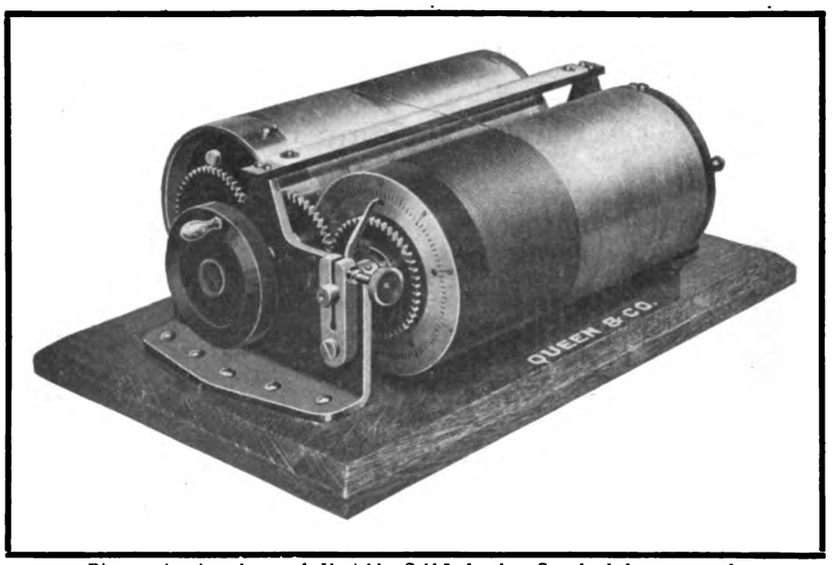

Fig. 2. Another form of Variable Self-Induction Standard known as the Parallel Cylinder type.

When all the wire is on the inductive cylinder, there are 100 turns, the self-induction of which is .47 millihenrys.

This apparatus is described in circular 1204, which also illustrates other models of high grade testing apparatus. It will be mailed by Queen & C., 1010 Chestnut street, Philadelphia, on request.

THE EDWARDS HINE COMPANY, Grand Rapids, Mich., is prepared to supply electrotypes of the emblem adopted at the National Interstate Convention as the official sign of the Independent movement. In a circular which it is distributing it illustrates with full size cuts twelve different styles for both single and two color reproduction. Each cut is accompanied with a number and its cost price. These prices vary from 15 to 66 cents each. The firm also makes a specialty of accounting and filing system for telephone exchanges of all sizes, and conducts a printing establishment for stock certificates, letter heads, etc. The circular above mentioned will be mailed to interested parties upon request.

THE INTERNATIONAL TELEPHONE MANUFACTURING COMPANY, Chicago, Ill., reports a heavy demand for its transmitters for equipping telephones and switchboards, especially for long distance toll line work, where the best transmission is required.

These transmitters are provided with an especially prepared and very hard granular carbon, giving the instrument a clear and distinct tone, and preventing deterioration from long and hard usage.

AMERICAN ELEC. FUSE CO. CELEBRATES OPENING OF NEW FACTORY.

THE American Electric Fuse Co. entertained a few of its customers and friends at its factory at Muskegon, Mich., on Sunday, Aug. 20.

The party inspected the plant in the morning, and had a picnic dinner on the shores of Muskegon Lake at noon. The afternoon was spent in fishing and other pastimes, the party returning to Chicago Sunday night.

The factory was opened on Aug. 1 and the complete manufacturing business of the American Electric Fuse Company is now installed there. The grounds are five acres in extent. Two large brick buildings have been erected, each having three stories

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PURE LEAD "GRILLS"

Welded to Strong Alloy Frames

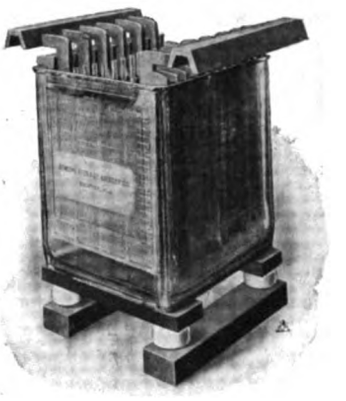
The Most Perfect Combination Ever Devised.

Low Charging Voltage Low Internal Resistance
High Capacity

GENERAL STORAGE BATTERY CO.

Works Boonton, N. J.

General Offices 42 Broadway, New York



FOR SALE

Advertisements under this head, $1.00 for 25 words or less for each insertion. Prepaid.

FOR SALE, CHEAP—600 pairs Kaisling self-soldering protectors. Also one 300 pair and one 500 pair American main distributing frame, used less than two months. Will sell separately or together. Address Virden Telephone Exchange, Virden, Ill., or Girard Telephone Exchange, Girard, Ill. 420

WANTED

Advertisements under this head 25 cents for 25 words or less for each insertion. Set in bold face type $1.00 per insertion for 25 words or less.

WANTED—Position as Exchange Manager by young man with practical, "all around" experience. Has been for two years, and is now, in charge of Bell exchange. Address, Box 410, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 410

WANTED—Position by young man as manager or trouble man in telephone exchange. Five years' experience. Energetic and a stayer. Address Box 435, care of THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York. 435

WANTED—Salesmen of ability for every State to handle line of first-class telephones, supplies and apparatus. Write, giving full particulars, age, salary expected, etc., to Box No. 439, care of THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York. 439

WANTED—Position as manager or superintendent by a practical telephone man; 12 years' experience in the above positions. Married, 31 years of age. Best of recommendations. Address M., 2119-A, Cass avenue, St. Louis, Mo. 441

WANTED—By thoroughly competent man, position as general manager. Have had eight years' experience with large Bell and Independent exchanges. Can furnish best of references. Address Box No. 443, care of THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York. 443

POSITION WANTED—In small exchange, as manager, wire chief, or general all-around construction or repair work. Experience all branches telephone work; eight years. Best references. Address Box 450, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 450

WANTED—Wire chief, exchange of 2,000 subscribers, Stromberg-Carlson system, southern location, who is familiar with locating cable faults; also want bright young man as troubleman on same exchange. Address Box 453, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 453

WANTED—Continued

POSITION WANTED—By switchboard man. Eight years' experience in exchange work; good references; moral; temperate. Address R. F. DuRant, Greenwood, S. C. 448

WANTED—First class traveling salesman—telephone apparatus—telephone supplies.

WANTED—Man to handle corespondence for telephone manufacturing company. Address Box 449, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York. 449

WANTED—Position as superintendent, where I can work and show my worth. Will come three months on trial. Expect $75, with increase of $10 per year. Address Box 430, care The American Telephone Journal, 116 Nassau St., New York City. 430

WANTED—Position as Manager or Superintendent by practical telephone man. Eight years' experience in above positions. Can furnish best of recommendations as to character and ability. Address Box 451, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 451

WANTED—Position by man with twelve years' experience installing, engineering, maintaining and managing telephone plants. Married, 37 years old. Best of references furnished. Address Box 454, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 454

POSITION WANTED by an experienced switchboard and telephone man. Understand all standard circuits and competent to do any class of telephone work. References furnished. Address M. C. Wilson, Carlisle, Ind. 455

WANTED—Position as secretary and general manager of large Independent telephone company. Working, and not time-serving position is desired. Address Box 456, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 456

WANTED—A man to fill position as wire chief. One who is familiar with both central energy and magneto system. We want an "all around" man. Address Box 457, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 457

WANTED—First-class young man as wire chief and switchboard man. Southern city of 12,000 inhabitants with 600 subscribers; common battery exchange. Man familiar with Stromberg-Carlson system preferred. Equipment all new and first class. State age, experience, whether single or married, and give references. Good salary. Address Box 458, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 458

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and fifty feet wide, one 210 feet and the other 150 feet long. Besides these there are additional one story buildings 165 feet in length, which are used as dry kilns, plating department, etc. The entire plant is new, having been erected for the special work of the American Electric Fuse Company, and is one of the most modern factories in the telephone business.

Everyone who attended the excursion had a most enjoyable time. The notice for this affair deserves mention, as its composition evinced a great deal of wit and humor. In short, it commanded the recipient to present himself at a designated meeting place, then to board a steamer for a trip across the rolling deep. In a foot note he was informed that the deep would cease to roll that night. An additional note stated that one's pocketbook was not required. Good old pocketbook.

THE MOON MANUFACTURING COMPANY, CHICAGO, Ill., reports that it purposes to protect all rights that it may have, granted by letters patent No. 794,742, under date of July 18, 1905, issued to Henry E. Procunier, president of the Moon Manufacturing Company, of Chicago, for improvements in "soldering nipples for electric cables." This patent broadly covers self soldering nozzles. Other patents pending cover the use of self soldering nozzles with terminals and junction boxes, also certain other features of Moon apparatus.

THE MALTHANER GENERATOR.

A SWITCHBOARD generator designed along original lines is being placed on the market by the Malthaner Electric Manufacturing Company, 2637 Lyndale avenue South, Minneapolis, Minn. The device consists of a powerful permanent magnet, surrounding a specially wound coil or transformer. The coil is provided with three windings, consisting of two primaries and one secondary. The coil is stationary and on the end of the core is attached a pole piece, and also on each pole of the magnet.

The three pole pieces are arranged in a quarter circle and a soft iron pivoted armature oscillates to and fro, in proximity to these pole pieces. Attached to the armature is a heavy faced platinum spring, which makes connection with the contact posts alternately, thereby cutting in circuit, first one primary circuit and then the other, causing an alternating current to be generated in the secondary winding of coil. Four or five cells are all that are required to operate it.

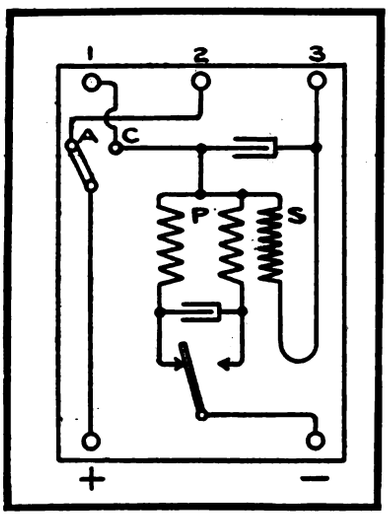

Fig. 1. Circuit connection of Malthaner Ringing Generator.

In Fig. 1 the circuit connections are shown. The battery is attached to the terminals marked plus and minus. *P* are the two primary windings and *S* is the secondary. 1, 2, 3 are the terminals for the circuit wirings to the keys. *A* and *C* are controlling terminals for ranging purposes. If the switch is in contact with *A* the generator only operates when the ringing key is pressed. When it makes contact with *C* the battery circuit is closed and the generator operates continuously. Fig. 2 gives the ringing key connections as applied to a magneto switchboard cord circuit.

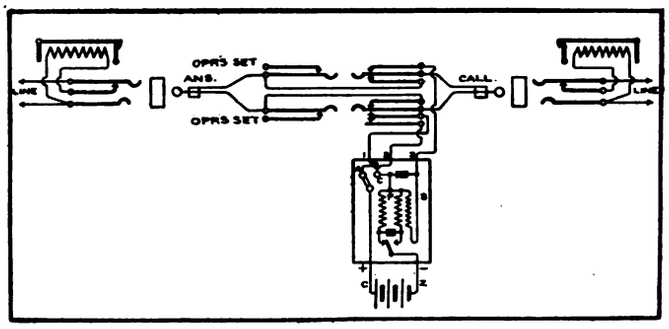

Fig. 2. Method of connecting generator to switchboard ringing key.

This device has been used to ring twenty instruments on a line successfully. It is especially adapted for branch exchange equipment or as an auxiliary generator for night work when it would not pay to operate a regular generator. It is made in two styles, one with a cabinet and one without. The company will be pleased to receive inquiries, furnish further details and quote prices upon request.

THE NATIONAL CONDUIT & CABLE COMPANY, 41 Park Row, New York, has issued a circular entitled Copper Gossip. It deals with the outlook which is, it states, improving. A general digest of the market is given, together with comparative quotations of New York and London prices. The exports and imports for the first seven months of the year are given in ton quantities. These are compared with the aggregate amounts for the similar period in 1904. The circular closes with news and developments, and European statistics relative to available supply.

G. M. GEST, the subway contractor of New York and Cincinnati, has just been awarded a contract for the construction of an additional subway to the present system of the Cincinnati Bell Telephone Company at Cincinnati, Ohio. The work is to be completed so that it can be used before bad weather sets in.

THE F. BISSELL COMPANY, Toledo, Ohio, wishes to draw the attention of the trade to its facilities for pole shipments. In a little folder it is distributing it describes its position as centre for pole distribution and also states that it is in an exceptionally good position to quote upon all sizes of cedar poles. This firm handles all descriptions of line material, including pine and fir cross arms, oak and locust standard pins, insulators and wire.

THE FAHNESTOCK TRANSMITTER COMPANY, 132 Havemeyer street, Brooklyn, N. Y., is mailing a card which draws attention to its spring binding post. It states that batteries equipped with this type of post cost no more than if a regular type is used. A sample will be sent free upon application.

THE BAIRD MANUFACTURING COMPANY, 6 Michigan, street, Chicago, Ill., reports an order for an additional 100 Secret Service telephones, from a company whose original installation consisted of only 30 of this type. One of the features claimed for this system is that every party on the line receives absolutely the same service. In addition, the transaction of confidential business, without the fear of any "listening in" has increased its applicability in many instances. Many of the companies using the Baird Secret Service Telephone System have rural lines over 20 miles long, on which they have from 10 to 20 telephones. They can furnish long distance and toll service to each subscriber without any interference from other parties on the same line.

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SUMTER

SOLD ON QUALITY—NOT ON PRICE

YOU NEED THE POWER

You can't pull a train with a jack rabbit. You can't work a heavily loaded party-line with three-bar telephones.

When you have overloaded your rural lines, our "Mammoth" New Beauty Telephones will help you. The generator has five magnets ⅞ x ½ inch each. Extra large cabinet to accommodate three dry cells. All other parts are "Sumter standard." This instrument is built for "the-man-who-overloads-his-lines-and-kicks."

Now if you want the results of best material, workmanship and design you get it here.

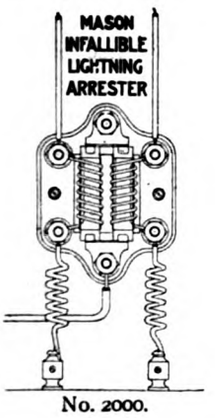
If you want something cheap, farewell; we are after the "man-who-KNOWS-QUALITY."

The SUMTER FACTORIES

THE SUMTER TELEPHONE MANUFACTURING CO.

SUMTER, S.C., U.S.A.

TELEPHONES, SWITCHBOARDS



No. 2000.

Lightning Eliminated!!

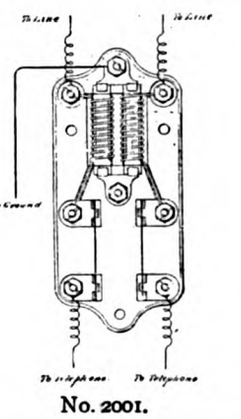
There has never been known a case where lightning has passed

THE "MASON"

Theoretically correct — remarkably efficient — a veritable barrier to lightning. Ask for Bulletin 38-S and prices.

Ewing-Merkle Electric Company

ST. LOUIS, MO.



No. 2001.

Patented Aug. 8, 1905.

See That Screw?

It makes a contact that is perfect without the necessity of cleaning or polishing the pipe.

WHY SPEND AN HOUR?

soldering a ground-wire when you can get a better contact in two minutes with the

Blackburn Ground Wire Clamp

WRITE TO-DAY FOR PRICES

GEO. R. BLACKBURN, 460 Quincy St., Cleveland, Ohio

Write Us To-Day

For our combination proposition on telephone and B. B. telephone wire.

Our new eight bar Bridging is a *Dandy*. It will ring through more bells than anything on the market.

REMEMBER

We ship the day your order is received.

Eastern Telephone Mfg. Co.

West Chester, Pa.

Please mention THE AMERICAN TELEPHONE JOURNAL when writing to ADVERTISERS.

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THE WEEK'S MESSAGES

FINANCIAL.

HASTINGS, NEB.—The Independent Telephone Company, Hastings, Neb., has increased its capital stock to $85,000.

MILLERSBURG, O.—The Millersburg, Worcester and Orrville Telephone Company will increase its capital stock from $200,000 to $300,000.

FRANCHISES.

OCEANSIDE, CAL.—The Oceanside Home Telephone and Telegraph Company has filed a petition with the city for a fifty-year franchise.

EMPORIA, Kan.—The Lyon County Telephone Company are trying to secure a franchise to build an exchange in Emporia, Kan.

MINNEAPOLIS, KAN.—The Rural Telephone Company, of Minneapolis, Kan., has applied for a franchise to build an exchange in Minneapolis.

LANCASTER, N. Y.—The Inter-Ocean Telephone Company has made application for a franchise.

ELECTIONS.

MOBILE, ALA.—The Home Telephone Company has elected the following officers, viz.: W. C. Polk, president; W. H. Bryant, vice-president and general manager; R. L. Douglas, secretary; A. Proskauer, treasurer.

FREDERICKSBURG, VA.—The Toluca and Fredericksburgk Telephone Company has elected the following officers: Hugh Adie, president, and C. A. Bryan, secretary.

COMBINATIONS.

ATHENS, ILL.—The Indiana Point Telephone Company, Athens, Ill., has sold its interests to the Monard County Independent Telephone Company.

CAMPBELLTON, NEW BRUNSWICK.—The telephone exchange in Campbellton, owned by the Restigouche Electric and Telephone Company, has been sold to the Central Telephone Company. The new owners have their headquarters at Sussex. It intends installing new telephones, putting in a metallic system, and giving Campbellton connection with other parts of the province.

MOOSE JAW, N. W. T.—C. A. Gass has sold out his telephone business at Moose Jaw, N. W. T., to the Mose Jaw Telephone Company, Limited, of which Charles Thomas is manager. The company will spend about $10,000 in reconstructing the system.

NEW COMPANIES.

FOWLER, CAL.—The Fowler Independent Telephone Company has been incorporated with a capital of $7,500 to give service to Fowler, Oleander, Del Ray, Lone Star and Fresno. The officers are: President, W. T. Crawford; vice-president, J. K. Kennedy; secretary, Irvin Hunter; treasurer, J. F. Annell.

SPRINGFIELD, ILL.—The Farmers' Mutual Telephone Company, of Washington county, Ill., has been incorporated; capital stock $10,000. Incorporators: J. J. Randall, C. H. Buhrmaster and J. McDowell.

DANVILLE, KY.—The Danville Home Telephone Company has been incorporated with a capital stock of $5,000. Officers: G. W. Welsh, Samuel Menifee and W. Ross Bastin.

WALKER, MINN.—The Farmers Mutual Telephone Company has prepared articles of incorporation.

ST. LOUIS, MO.—The American Phantom Circuit Telephone Company has been incorporated with a capital stock of $10,000. Incorporators: R. C. Stubbs, E. H. Cary and Joseph R. Lowry.

OKLAHOMA CITY, OKLA.—The Northwestern Rural Telephone Company, of Oklahoma City, Okla., has been incorporated with a capital stock of $10,000. The directors of the company are: George G. Miller, D. A. Shriner, J. C. Young, W. H. Shellenberger and W. M. Clapper, all of Oklahoma City.

TEDDY, OKLA.—The Caddo Telephone Company has been granted a charter at Teddy, Okla.; capital stock $5,000. Directors: George H. Studebaker, Ora F. Studebaker, Louis H. Fahring.

BURGESSVILLE, ONT.—The Burgessville Telephone Company, Limited, has been organized, with head office at Burgessville. The directors are: Messrs. Martin Emigh, J. G. Corless, H. E. Service, Henry Sneath and William T. Nutt.

CAMBRA, PA.—The Luzerne and Columbia Telephone Company, at Cambria, Pa., has been incorporated. The incorporators are as follows: M. H. Brittain, president; B. H. Bowman, vice-president; John W. Hughes, secretary; Dr. Davison, treasurer, and A. T. Dymond, manager.

CARPENTER, S. D.—The Carpenter Telephone Company has been incorporated with a capital of $25,000, to give Independent service in this town. The officers are: S. L. Wood, president; E. H. Baker, secretary and treasurer.

WINCHESTER, VA.—The United Telephone and Telegraph Company, Winchester, Va., has been incorporated. The officers are: R. G. Parker, president; S. R. Caldwell, secretary and treasurer, both of Philadelphia, Pa. Capital $5,000.

GRATIOT, WIS.—The La Fayette Telephone Company, Gratiot, La Fayette county, has been incorporated with a capital stock of $25,000. Incorporators: H. W. Burmeister, S. Birkbeck and Ed. Brannan.

UNDERGROUND.

CHAMPAIGN, ILL.—The Home Telephone Company is to place its wires underground.

PEEKSKILL, N. Y.—The State Line Telephone Company is installing an underground system in this city.

MISCELLANEOUS.

OTTAWA, CANADA.—Before the Parliamentary Committee at Ottawa, J. H. Winfield, manager of the Nova Scotia Telephone Company, stated that that company had about 2,360 instruments and that there was a telephone to every 74 persons in the province of Nova Scotia.

BOLTON, CONN.—The Bolton and County Telephone Company held its annual picnic at Bolton, at which there was a large attendance.

CANTON, ILL.—The Canton Home Telephone Company will secure connection with Peoria in the near future.

ALBION, ME.—The Unity Telephone Company will extend its lines and improve its system in this village.

LA FAYETTE, IND.—The Home Telephone Company will spend $75,000 on improvements.

WOODLAWN, MD.—An Independent system is to be installed in this town in the near future.

CHIGUAHUAPAN, STATE OF PUEBLA, MEXICO.—An extensive system of Independent long-distance telephone lines centering at Chiguahuapan and extending to the capitals of all the districts of the State of Puebla was formally inaugurated a few days ago.

CHOLULA, STATE OF PUEBLA, MEXICO.—An Independent telephone line from Cholula to Acatepec has been placed in operation.

WOOD LAKE, MINN.—The local Telephone Company has moved its exchange to a new building and made other improvements.

STANBERY, MO.—The Stanbery Telephone Company has erected 3,500 feet of new cable. A new distributing board and a new toll switchboard will be added in a short time.

EXETER, NEB.—The Fillmore County Telephone Company has built new metallic lines to Friend, Milligan and Geneva. A new copper line to Lincoln, of the most modern construction, will soon be in operation, connecting with the 3,000 subscribers at that point.

MADISON, WIS.—The Dane County Telephone Company has issued its new directory. The list includes upwards of 2,350 subscribers and 200 toll stations.

PERSONAL.

DANIEL AGNEW has been appointed manager of the Rochester, Ind., Telephone Company at Rochester.

A. V. BUEK has been appointed manager for the Union Telephone Company at Bonaparte, Ia.

FRANK CANADAY has been appointed manager for the Local Telephone Company at Chicago Junction.

MENZO FRETZ has been elected manager of the Harlan and Avoca Telephone Company, with headquarters at Harlan, Ia.

C. G. GIFFORD has been appointed State representative for the Strom-

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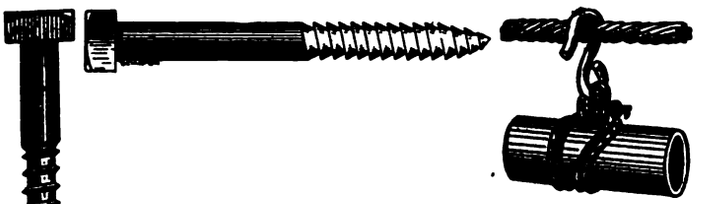


The house that saves you money on telephone supplies and line construction tools and specialties

We guarantee our goods and ship promptly

Place a "trial" order and see if it isn't so

Our Free Estimate Blank is a great help

Write us to-day

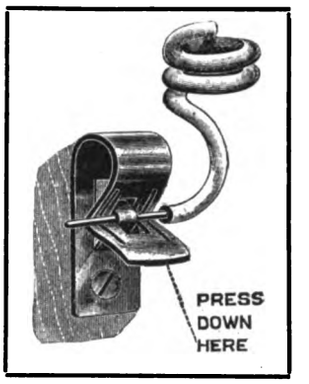
SCHAPER CONSTRUCTION MATERIAL CO.

Electrical Exchange Bldg.

136 Liberty St.

New York City

REMEMBER



Batteries cost no more when equipped with the Fahnestock Spring Binding Post than with the old style Screw Post.

Let us send you a sample. It's free.

Fahnestock Transmitter Co.

132 HAVEMEYER STREET, BROOKLYN, N. Y.

I AM NOT A COMPANY

and when I say I, I mean me. I wrote a book. It is called "Dirtology." I also make and sell the most practical, strongest, cheapest land anchor ever used. I know it will save you time and money on every pole you guy. I wrote the book to prove it. The book is called "Dirtology"; the anchor is called "Bull Tongue."

"Dirtology" free.

"Bull Tongue" cheap.

I. A. BENNETT

CHICAGO

141 South Clinton Street

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THE WEEK'S MESSAGES—*Continued*

berg-Carlson Telephone Manufacturing Company for the State of Kansas, with headquarters at Kansas City. Prior to holding this position he was employed as correspondent salesman for the same company.

A. R. HORN has been appointed manager for the local telephone company at West Bend, Ia.

E. C. McCARTHY has been appointed superintendent of construction for the Pittsburg and Allegheny Telephone Company. He started with this company as gang foreman when the company was first organized six years ago. His experience extends over a period of seventeen years, being started as an inspector in Toledo, O., for the Central Union Company. Since then he has worked his way up to the present position. He is one of the best known construction men in the country.

W. C. MORGAN has been appointed manager for the Mississippi Telephone Company at Morning Sun, Ia.

LOUIS MUHLHEIZLER has been appointed superintendent of maintenance for the Pittsburg and Allegheny Telephone Company, with headquarters in Pittsburg, Pa.

B. FRANK NELSON has accepted a position with the Utica Home Telephone Company at Utica, N. Y.

W. W. NICHOLSON has been appointed general superintendent of the Empire State Telephone and Telegraph Company, with headquarters at Syracuse.

RICHARD ROBBINS has been appointed suburban district manager for the New England Telephone Company at Boston, Mass.

New Construction in the Field

PHOENIX, B. C.—The British Columbia Telephone Company is rebuilding its line between Phoenix and Cascade, a distance of 25 miles. It will build an exchange on Seymour street, Vancouver.

WHITTIER, CAL.—The United States Long Distance Telephone and Telegraph Company is building a trunk line from Los Angeles to San Diego, by way of Whittier, Norwalk and Santa Ana. The route will follow the county road from Montebello to Los Neetos, through Santa Fe Springs, to Norwalk.

MOKINA, ILL.—The Inter-State Telephone Company is installing an exchange in this town.

VINCENNES, IND.—The Farmers' Mutual Telephone Company is building a line to Billett.

ROCK RAPIDS, IA.—The Rock Rapids Telephone Company is extending its system. A new hundred pair aerial cable is to be installed.

DOWNS, KAN.—The Downs & Western Telephone Company is building several new rural lines besides over 100 miles of toll lines.

GRENOLA, KAN.—The Central Telephone Company, of Grenola, has begun construction of its exchange. It expects about 150 city subscribers, besides a large number of rural ones.

ROCKLAND, ME.—The Knox Telephone Company will extend its lines to Waldoboro, Jefferson and North Ham.

NORRIDGEWOCK, ME.—The Somerset Farmers' Co-operative Telephone Company has constructed a line to Starks.

FARIBAULT, MINN.—The Rice County Telephone Company is making connections with the Tri-State Company's lines and building three new lines to Morristown and Nerstrand.

GRAMWOOD, MINN.—The Tri-State Telephone Company is installing a toll line to connect its system with the Merchants' and Farmers' Telephone Company, of Shakopee.

HATTIESBURG, MISS.—The Jones-Winter Independent Telephone Company will expend $100,000 in improvements.

ALTAMONT, MO.—The telephone system being installed by George Dice is nearing completion. It will be connected with Gallatin, Hamilton, Kidder and Winston.

SHILOH, N. J.—The Interstate Telephone Company is contemplating building a new line to Cohansy and otherwise extending its system at this point.

BINGHAMTON, N. Y.—The York State Telephone Company has purchased the property at present used for its exchange and will remodel the system.

BUSHKIRK, N. Y.—The Independent line from this point to South Cambridge has been extended to West Cambridge.

GERMANTOWN, N. Y.—The Columbia Telephone Company is building a system in this village.

POUGHKEEPSIE, N. Y.—The Dutchess County Telephone Company has installed a complete new switchboard equipment at a cost of $25,000.

WHITE PLAINS, N. Y.—The State Line Telephone Company is building toll lines to connect all the towns and villages in Westchester county.

BOWLING GREEN, O.—The Lake Erie, Bowling Green and Napoleon Railway is installing a telephone system covering its entire lines.

STEUBENVILLE, O.—The Phoenix Telephone Company will install a new switchboard at this point.

NORMAN, OKLA.—The Pioneer Telephone Company is building two new toll lines from Oklahoma to Dallas, Tex., through this town.

SHAWNEE, OKLA.—The Pinoneer Telephone Company is building a new copper toll line to Ada by way of Asher.

BANCROFT, ONT.—The Independent line from this point to Eldorado is to be extended to Coe Hill, Stola, Trenton, Madoc, Marmora, Belleville, Bird's Creek and Maynooth.

CARLISLE, PA.—The York Telephone Company has erected a new line to this point.

BRENHAM, TEX.—The Brenham-Shelby Telephone Company is to extend its line thirty miles.

KURTEN, TEX.—Dr. W. F. Odom has built a new line from this point to Reliance.

WILLOWHOLE, TEX.—W. L. Zulch is building an extension to his system from this point to Cross.

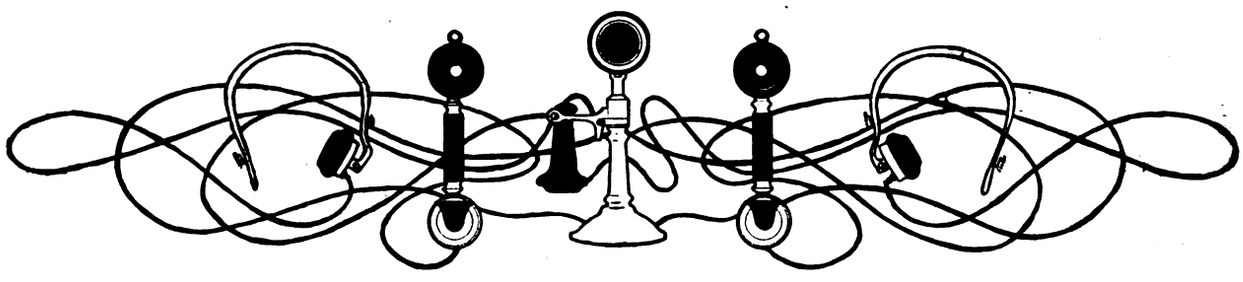
ENOSBURG FALLS, VT.—The Northern Telephone Company has recently built a line from Enosburg Center to North Enosburg.

OFFLEY, VA.—The Farmers' and Merchants' Telephone Company is pushing the work upon its system at this point.

APPLETON, WIS.—The Fox River Valley Telephone Company has about 700 subscribers at this point and is installing a new board to care for new subscribers.

FOOTVILLE, WIS.—The Footvile Telephone Company is erecting new poles and making other improvements to its system in this village.

SUPERIOR, WIS.—The People's Telephone Company will install new equipment which will include a switchboard, terminal racks, power plant, including gas engines, storage batteries, dynamos.



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CENTURY
100% GOOD

THE PLATINUM ELECTRODE TRANSMITTER

originated, and manufactured only by us, will give you absolutely perfect service — on common or local battery systems.

PLATINUM, due to its peculiar qualities, is better adapted for electrodes than any other substance. It has an extremely low surface resistance, will not disintegrate, or cause packing or frying in the transmitter, and will give at all times a perfect reproduction of the original sound waves.

The PLATINUM ELECTRODE TRANSMITTERS are furnished on all CENTURY telephones — for local or common battery service.

CENTURY TELEPHONE CONSTRUCTION CO.
332 ELLICOTT STREET
BUFFALO, N.Y.

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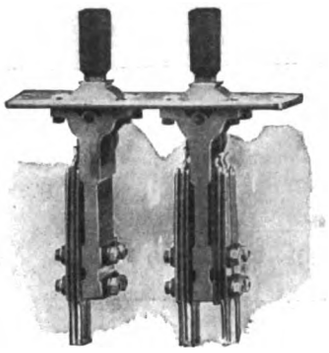
MONARCH SWITCH BOARDS

THE KEY

By placing the springs on both sides of the brass support a most rigid mounting is secured.

The screws holding the springs extend through both sets of springs and the mounting and are held by nuts. They are protected all of the way by hard rubber bushings.



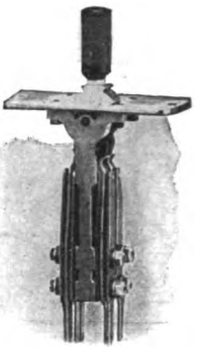
The springs are made of German silver and are of such length that no great strain is felt at any point when the cam is operated.

All contact points are platinum rivets.

The rollers are large and therefore make the action smooth and easy. They are loose upon the supports, being held in place by the sides of the brass mounting. No small screws or washers to get loose.

The cam is a single piece of solid brass. The roller supports are part of the cam, being studs left after the sides have been milled off. No pins to work loose.

The flange or shoulder at the top of the cam makes a positive stop as it strikes the escutcheon when the key is thrown. There are no pin stops to break. Neither is there any wear on the rollers, as they never strike the escutcheon.



The mounting is held to the escutcheon by four screws put in from underneath. This leaves the top smooth.

The escutcheon is steel, given a bauer-barff finish. The cam is brass. Unlike metals wear better together than like metals.

The construction of the key is flexible. Almost any combination of springs can be produced.

MONARCH TELEPHONE MANUFACTURING CO.

10-16 SOUTH CLINTON STREET **CHICAGO, U. S. A.**

$4.60 AUTOMATIC vs. $9.40 MANUAL

Our automatic telephone system has been adopted in the following cities:

CHICAGO, ILL.	PORTLAND, ORE.
GRAND RAPIDS, MICH.	WOODSTOCK, N. B.
COLUMBUS, OHIO.	ST. MARY'S, OHIO.
DAYTON, OHIO.	WESTERLY, R. I.
LINCOLN, NEB.	MANCHESTER, IA.
PORTLAND, ME.	PRINCETON, N. J.
AUBURN, N. Y.	ALBUQUERQUE, N. M.
LEWISTON, ME.	VAN WERT, OHIO.
AUBURN, ME.	BATTLE CREEK, MICH.
FALL RIVER, MASS.	CLAYTON, MO.
NEW BEDFORD, MASS.	PENTWATER, MICH.
LOS ANGELES, CAL.	TORONTO JUNCTION, CAN.
SAN DIEGO, CAL.	WILMINGTON, DEL.
HOPKINSVILLE, KY.	RIVERSIDE, CAL.
SIOUX CITY, IA.	TRAVERSE CITY, MICH.
CLEBURNE, TEX.	HASTINGS, NEB.
COLUMBUS, GA.	WAUSAU, WIS.
SOUTH BEND, IND.	EL PASO, TEX.
ABERDEEN, S. D.	HAVANA, CUBA.
MIAMISBURG, OHIO.	MARIANAO, CUBA.
MEDFORD, WIS.	BERLIN, GERMANY.

Operation and Maintenance Expense per 'phone per annum of one of the Telephone Companies that replaced their Manual with our AUTOMATIC SYSTEM. (We will send name of company and detailed statement of above upon request.)

This saving of more than 50 per cent. in Operation and Maintenance cost is pretty strong evidence of the economy of Automatics.

Hand in hand with the decrease in operating expenses goes the increase in quality of service. This latter means more business. All these Automatic advantages combined mean higher values for securities, bigger dividends for the stockholders.

Don't you see that you're wasting money on that out-of-date Manual equipment of yours? If you're a new company, start with Automatic, and start right.

AUTOMATIC ELECTRIC COMPANY

Van Buren and Morgan Sts. **CHICAGO, ILL.**

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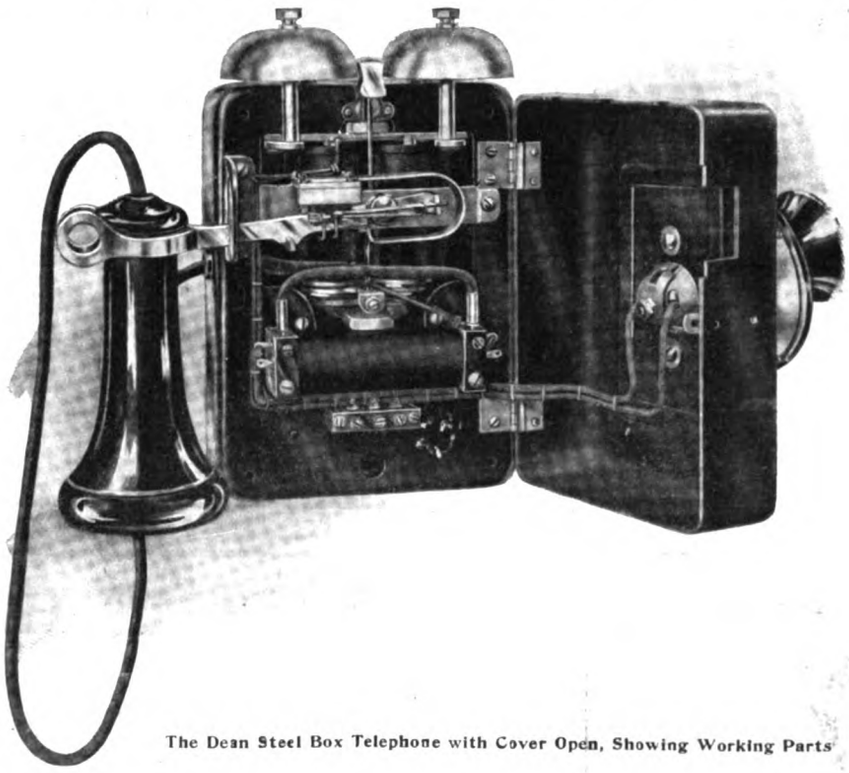
DEAN TELEPHONE APPARATUS

A RESIDENCE TELEPHONE



The Dean Steel Box Telephone with Cover Open, Showing Working Parts

Experience has shown that our Steel Box Telephone is an ideal instrument for residences.

It is extremely compact, yet has full size apparatus, so that talking and signaling are not impaired in the least.

It is of pleasing appearance, finished in tough enamel with nickel trimmings, and will always look good—even with abuse.

It has an adjustable transmitter arm, removable lever type hook switch, new Dean transmitter, receiver, ringer, condenser and our Wheatstone's bridge talking circuit. A most powerful combination.

We can fit these telephones with our new Dean party line ringers to work on our four and eight party line selective system or on any frequency signaling system.

Let us know your requirements. We will be pleased to give you prices.

THE DEAN ELECTRIC COMPANY
ELYRIA · OHIO

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SAVE YOUR MONEY

INCREASE YOURP ROFITS

Buy Your Telephones and Switchboards from us.

Our Columbia 'Phones can't be beat for Quality and Price.

Write for Our Price and List of Second-hand Equipment.

Special attention given to Telephone Repair Work.

We are always in the Market to Buy your old 'Phones and Switchboards.

GUARANTEE TELEPHONE & EQUIPMENT CO.
60-68 W. Van Buren Street.
CHICAGO, ILL.

The Vought-Berger Telephones

ARE THE VERY BEST TELEPHONES

Why?

Because the Cabinets are faultless.

Because the Transmitters are clear-toned and enduring.

Because the Receivers are extraordinarily responsive.

Because the Generators are of an efficacy unequalled.

Because the Ringers are peculiarly accordant.

Because the Induction Coils are wound to an exactness.

Let us tell you the countless other reasons. They will interest you.

The VOUGHT-BERGER COMPANY

Makers of First-Award Telephones and Switchboards

La Crosse, Wisconsin

AUTOMATIC INTERCOMMUNICATING 'PHONE for EXCHANGE CONNECTION

EXTREMELY SUCCESSFUL.
NON-INTERFERING TRUNK BUTTON.
HARD RUBBER CONNECTIONS.
SWITCH NOT DEPENDING ON GRAVITY.
FOR COMMON OR LOCAL BATTERY EXCHANGES.
ABSOLUTELY NON-INTERFERING.

CONNECTICUT TELEPHONE & ELECTRIC CO
MERIDEN, CONN., U. S. A.

BE AS HONEST

with yourself as we are in the manufacture of *International* Apparatus. Give us the opportunity of estimating on your next order for telephones or switchboards. Recent installations in the U. S. and Foreign Countries are convincing.

International Telephone Mfg. Co.
HARRISON AND CLINTON STS.
CHICAGO, ILL.

ERICSSON DRY BATTERIES
STANDARD OF THE WORLD
They are perfect and not expensive. ***Write for particulars.***
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296 BROADWAY - NEW YORK CITY

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Ready Pole Seats

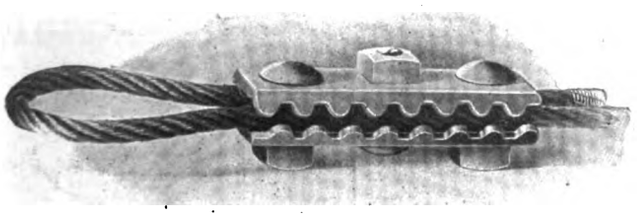
Strongest Pole Seat Made.

All Iron, adjustable to any Pole.

Ready Reels, Tools, &c. Cable and Telephone Supplies

The W. G. Nagel Electric Co.

Toledo, Ohio.



UNIVERSAL GUY CLAMPS

ONE, TWO OR THREE BOLT

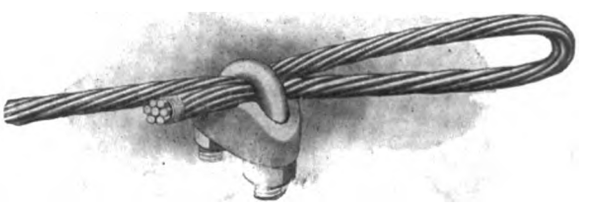
Actual comparative tests proved that COOK'S UNIVERSAL GUY CLAMPS held MORE THAN TWICE AS MUCH as any other clamp. ONE Universal can be used in place of TWO of any other kind—consequently they cost half as much. They take any size strand from 3-16 to ½ inch. It is unnecessary to carry an assortment of sizes in stock. Made of heavy malleable iron castings; thoroughly galvanized. Assembled by hand—the nuts will not stick.

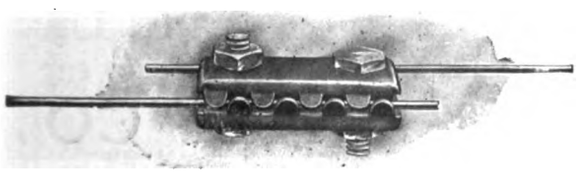
Price—1 bolt .08, 2 bolt .12, 3 bolt .15.

"U" BOLT CLIPS

Like the Universal Clamp Cook's "U" Bolt Clip will hold TWICE AS MUCH as any other of this type on the market. Costs less, too. Made of best material, galvanized and assembled by hand.

Price .08 each.





Multiple Contact Test Connectors

From the construction of these test connectors many points of contact are assured—a feature impossible to secure with the solid connector. TYPE OO Connectors will take any size wire from No. 6 to No. 22. Made for either copper or iron wire. Lock nut on bolt.

Price—1 bolt .05, 2 bolt .10.

DISCOUNTS ON QUANTITIES

Frank B. Cook.

238 W. Lake Street
CHICAGO, ILL.

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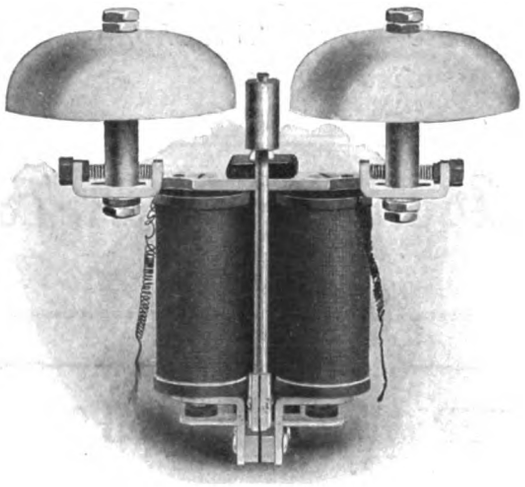
KELLOGG PHILOSOPHY *THE BEST IS THE CHEAPEST*

THE NEW

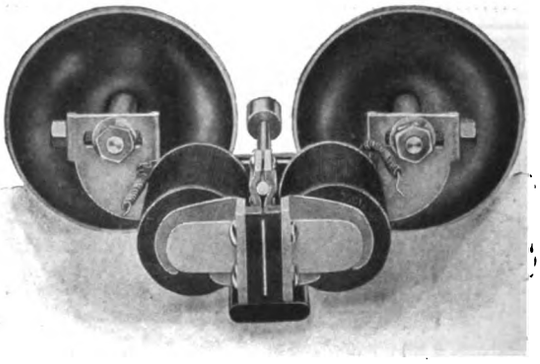
4-PARTY

KELLOGG HARMONIC RINGER

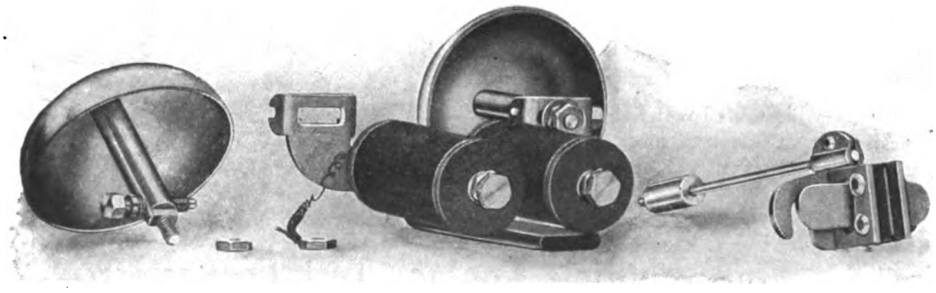
THIS RINGER WAS DESIGNED TO OBTAIN THE FOLLOWING ADVANTAGES



1—Interchangeability with straight line ringers.
2—Outside appearance of telephone set with this four-party ringer is identical with straight ringer.
3—Easy interchangeability of different clappers, so as to be able to change over from one party to another any time on the spot.



4—A substantial ringer with quick and secure adjustment.
5—The permanent magnet is in metallic contact with the armature.
6—No grounds are needed anywhere.



7—Great economy in operation.
8—A perfect party line ringer.

Send for information and prices.

KELLOGG SWITCHBOARD & SUPPLY CO.

CONGRESS AND GREEN STREETS, CHICAGO, ILL.

BRANCH OFFICES

PHILADELPHIA, PA.	CLEVELAND, OHIO	NEW YORK CITY	LOS ANGELES, CAL.
Keystone Building	Electric Building	116 Nassau Street	Seymore Building

Please mention THE AMERICAN TELEPHONE JOURNAL when writing to ADVERTISERS.

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A Trial will Prove its Superiority

The Western Pole Hole Digger

Fastest and Strongest

The Western is new in its action, it's just "push down, pull up and let go." Will dig faster in any kind of soil than any other digger or combination of tools now in use. Dislodges and lifts out large stones, cuts thick roots, holds thin slush or dry sand.

Best 2d growth ash handles.

Heavy shovel plate blades.

Standard 5-ft. handle..... $1.35 each
Special telephone, 7-ft. handle. 2.00 "

Special discounts on samples and large orders.

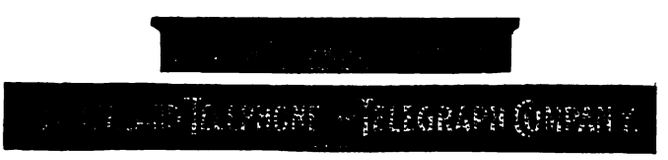
Western Steel Gate Co.

GREEN BAY, WIS.

HALLER MACHINE CO.

127 FULTON STREET, CHICAGO

DESIGNERS AND MANUFACTURERS OF ELECTRICAL AND MECHANICAL SPECIALTIES



Above cut shows Standard Telephone Hotel Switchboard Glass Signs With Jeweled Letters

ALL METAL ELECTRIC SIGNS
TRANSPARENT GLASS SIGNS

WE MAKE MANY KINDS OF SIGNS
SEND FOR OUR BULLETINS

Sheet Metal Specialties, Punch Press Work, Electrical and Machinery Specialties, Die Work, Gear Cutting, Etc.
TO ORDER

No.
18

HIGHEST POINT OF PERFECTION

Transmission
Workmanship
Finish

OUR SUCCESS ATTAINED BY STANDING BACK OF OUR GUARANTEE

Sterling Electric Co.

LA FAYETTE, INDIANA

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STROMBERG-CARLSON

"All Metal Type Central Energy Telephone"

Fig. 1. Closed View.

Figures 1, 2 and 3 show illustrations of our new all-metal Central Energy Telephone, designed principally for hotels and residences. The instrument is very small and compact, yet the apparatus is so arranged that there is sufficient space for getting at any of the parts for inspection or adjustment.

The case consists of two parts, both of which are drawn from mild sheet steel. It has no seams, sharp corners or edges, and is very attractive. The standard finish is black enamel, but we can furnish them in any other color, if desired, at a slight additional charge.

So much care has been given to the matter of insulation and the wiring of the apparatus that it would be almost impossible for a subscriber to receive a shock while using the telephone.

Some of the principal features are a self-contained ringer, so mounted that the coils can be readily replaced or adjustment changed easily and quickly, if necessary; a self-contained hook-switch, with contacts so arranged that they can be easily examined; a hard rubber terminal block, to which all of the various terminals are fastened by neat and substantial terminals; an induction coil that can be easily removed; a bell clapper guard and a compact adjustable transmitter arm of the ball and socket type, so constructed that no screws or fastenings are exposed; a screw lock for fastening the case, the screw being provided with a spring movement which prevents the threads on the end of the screw from being damaged when the case is closed, and is so arranged that it cannot fall out and get lost when the instrument is opened.

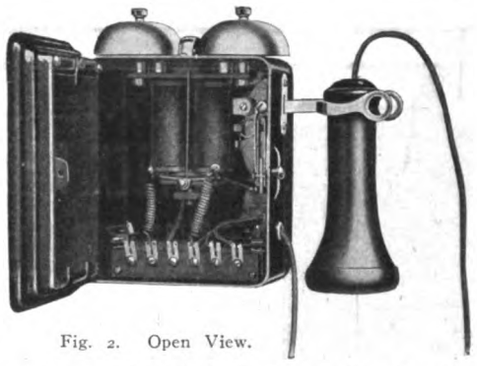

Fig. 2. Open View.

Fig. 3. Side View.

This telephone and its various parts are made from the very finest set of tools and dies that could be produced. Uniform parts are guaranteed.

We can fill orders promptly for this telephone. If you will give it a trial we are sure you will use no other.

We Mail Descriptive Printed Matter Free

TELEPHONE M'F'G. CO.

ROCHESTER, N.Y. CHICAGO, ILL.

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A Few Months Ago

we began a series of advertisements descriptive of the methods used in the manufacture of lead encased telephone cable. We did this to acquaint telephone men with the modern methods we employ and to demonstrate beyond a doubt that "we make cable." The series began with a description of the raw materials and the various operations through which it passed before a cable is finished ready for shipment. This seemed to prove so interesting that we have decided to reproduce the whole story in a booklet. We shall be glad to receive the name of any telephone man who would like a copy. We expect to run a new series, during the next few months, relating to the general uses to which cable may be put. In connection with this will appear various photographic illustrations of cable installations. We have quadrupled our capacity in two years. *There's a reason.* It's quality that counts in cable.

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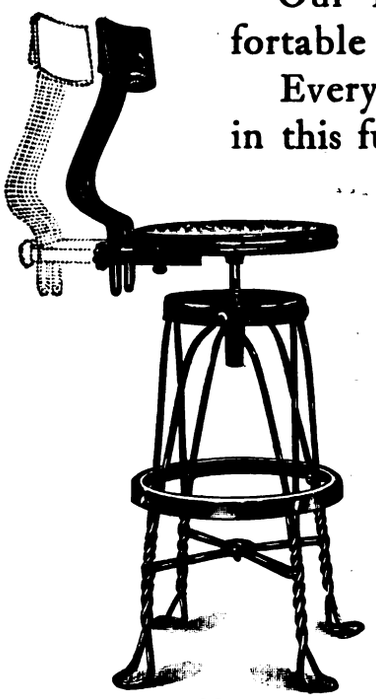
Let the Operator be Comfortable

She can do more work if she is.

Our METAL OPERATOR'S STOOL will be more comfortable for her than any other kind of a stool you could get.

Every possible adjustment for her comfort has been embodied in this furniture.

The wood work is furnished in either oak or birch, mahogany finish.



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Private Exchange Installation-Arrangement

ARTICLE I.

By Chas. H. Coar.

ONE conversant with the trend of telephone development will not fail to realize that the demand for private exchanges is becoming greater year by year, partly because of the special efforts exercised by some companies to secure contracts of this description, and also because large users of telephones have been educated in the advantages obtained by their use.

When a telephone company endeavors to place an order with a concern for a private branch installation one of the factors that usually bobs up on the part of the business concern is that it has not sufficient spare space to accommodate the switchboard and appliances. Often then the telephone company through its solicitor or otherwise plans to either rearrange the office furniture of the concern in question or to remodel its switchboard into such shape that it will meet the necessary requirements.

Fig. 1. A poor switchboard arrangement; note the crowded condition.

Not invariably in instances of this kind the switchboard is placed in the midst of a score of typewriters or other noisy apparatus so that only the worst kind of operating service is possible. The view shown in Fig. 1 brings out some of these points very clearly. Because of the small space available in this office the switchboards of both systems are crowded in among the other office furniture, much after a Chinese puzzle fashion. When any repairing is to be done in the rear of one of these switchboards the inspector has the choice of crawling on his hands and knees under a desk or going over the top of the switchboard by means of a chair or stepladder. Once back of the switchboard, if the inspector is small in size and a fairly good contortionist, he possibly can do some work. The proximity of the typewriters to the switchboards cause much confusion during the handling of calls, when the machines are in operation, because the switchboard transmitters are in a position to readily pick up this noise.

One operator answers both these systems. The funnel shape arrangement shown in the view is a speaking tube which connects with the president's office. When he desires a telephone connection he speaks into a similar arrangement in his office. The operator hears this order and completes it, ringing his telephone when the desired party is in connection. This is done to save the president's time.

An ideal switchboard location is shown in Fig. 2. Here ample space is provided on all sides of the board and it is in a room by itself. An abundance of natural light and fresh air has access to this room, making the conditions for operating as nearly perfect as possible. At the time this view was taken the switchboard was "plugged up" for operation during the absence of the operator. The difference between these two locations is very evident both from an operating and maintenance standpoint.

Solicitors for these installations should, as far as their knowledge will permit, aim to advise the prospective subscriber as to the best location for the board when all the points involved are taken into consideration. It means much in the future development of the plant.

When this his been determined some plan of procedure for the installation should be considered. The different routes, lengths of the various runs to the telephones, the nature of the walls, floors or ceilings should be investigated in order that the best will be selected. It is good practice to install a cable box, as shown in Fig. 3, in which the cables from the switchboard and the lines terminate. It is then possible to cross connect any line at this point and a neat appearance will be presented. Interior cable should be employed for the lines if the number of telephones in any particular section warrants their employment, because cable makes a better appearance and is more readily installed than single wires or twisted pairs. The different circuits and apparatus should be so placed that they will not be subjected to any unnecessary wear, dampness or other detrimental conditions.

It is advisable in the majority of instances to obtain the current supply for these systems from the main exchange battery, as a

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way to the top of the jar after the elements are in, better service is secured in addition to reduced cost because a smaller amount of solution is used. The zinc connecting wire is frequently eaten off in the porous cup solution. If this is not due to a short circuit existing in the battery circuit, it can in most cases be remedied by thoroughly amalgamating the connecting wire throughout its entire length.

The zinc connecting wires are sometimes eaten away because the solution in the porous cup is identical with that in the element jar, whereas it should be a salted solution of soft water along with a little mercury for amalgamating purposes. In renewing these cells the writer has found it beneficial to boil the porous cup and carbon in hot water so that all the sediment will be dislodged from them. Whilst boiling it is best not to expose the top part of the carbon to the hot water, if it is paraffined, as this will melt off and thus destroy some of the insulating qualities. The conductors from the battery to the switchboard should be large and of low resistance, thoroughly insulated. At installations where a breakdown would be a serious inconvenience a duplicate set of cells should be provided. This should be arranged as shown in Fig. 4, so that it can be placed in service by means of the switch at such times as the regular current supply is defective. Two sources of ringing current should be provided as well and arranged as shown in Fig. 5. In some installations it becomes desirable to connect more than one telephone to a certain trunk line at such times as the regular operator is not on duty. The arrangement shown in Fig. 6 is sometimes employed to do this and consists merely of connecting any predetermined number of plugs and cords together. By placing one of these plugs in a trunk line this trunk line is connected to the remaining plugs, which can be placed in the desired jacks, thereby furnishing a central connection to any desired number of telephones. Some code arrangement for receiving the incoming signals will be necessary, as all the connected telephones will ring at the same time and thus cause confusion, unless otherwise provided for by a predetermined system of signals.

(*To be continued.*)

Fig. 2. A well-located branch exchange.

Where it is necessary to utilize primary cells for the current supply, a type having a low internal resistance combined with a large current output should be employed. While there are many circuits capable of being successfully operated by dry cells, it is not good practice to employ them if the installation is to be subjected to much continuous usage. Dry cells are expensive in installations of this kind and it is a rare occurrence where a number are employed, when one or more do not become defective from operation for any length of time, causing poor transmission and other serious inconveniences. The Fuller cell is best adapted for this purpose when all the points involved are taken into consideration. It has a comparatively low internal resistance, a large current output and does not readily polarize. If it is properly set up in a clean and ventilated position it will under ordinary conditions give very satisfactory service. One fault in connection with this type of cell, is that when set up too much acid solution is frequently used in the element jar. Some specifications state that the element jar should be filled with solution to within two inches of the top when all the elements are in place. My experience has been that if the acid line is about half way to the top of the jar after the elements are in, better service is

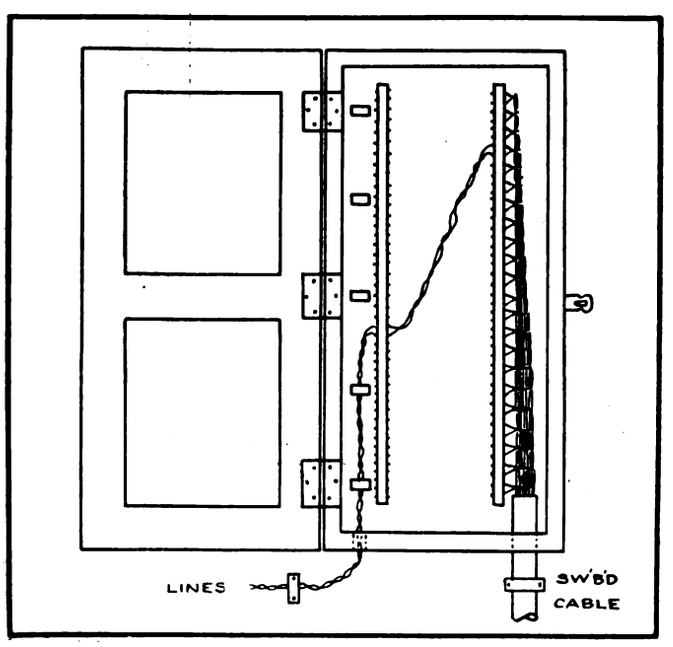

Fig. 3. Terminal and cross-connecting box.

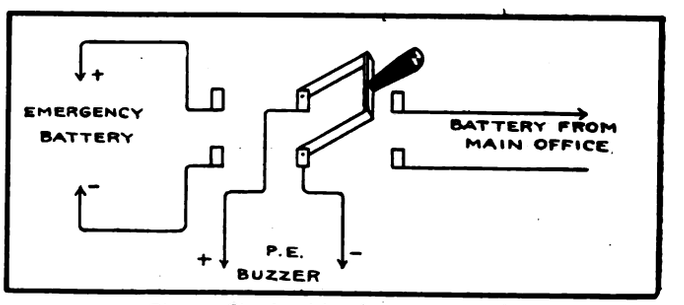

Fig. 4. Circuit wiring for current supply.

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The Railway Telephone Service; Cost of Line Construction*

By Frank F. Fowle.

It is important from a traffic standpoint not to bridge intermediate way offices on busy trunk lines. Party lines are not economical except when the traffic per station is very small. If a station at some point on a through or trunk circuit has enough business to warrant telephone connection, it is usually the best plan to simplex or composite an iron circuit to the nearest office at which there is a private branch exchange. A busy station permanently connected to a trunk circuit is uneconomical of the line, if the line is of any considerable length.

The Operating and the Traffic Departments are usually large users of the telephone service, and properly so; the Supply Department may use the service to a considerable extent, also. The other users should be restricted in order to place the service at the disposal of those in a position to make the best use of it.

The daily message capacity of a telegraph circuit is about 250 messages—on a 9-hour basis. Railroad messages are of much greater average length than commercial messages and are not usually condensed to the same extent. The same is true of telegraph circuits that is true of telephone circuits, as regards the increasing delay with increasing traffic. For heavily loaded way circuits, under conditions where the way station attendant is a telegraph operator only incidentally, the telegraph probably handles the traffic as cheaply as it is possible to handle it, if the traffic per station is small.

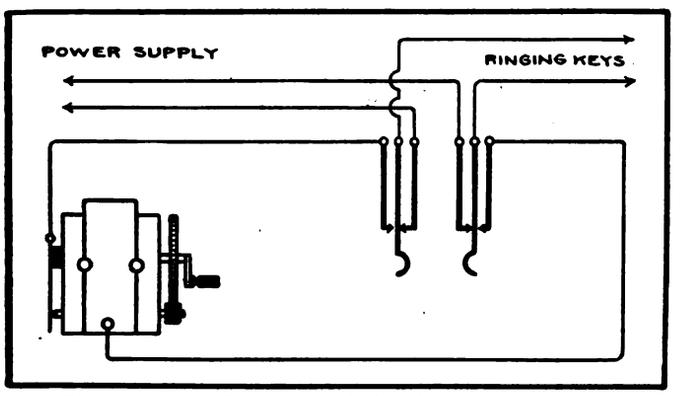

Fig. 5. Method of connecting ringing circuits (see page 191).

The relative efficiency of the telegraph and the telephone is a very broad question and one affected by many considerations. The following comparisons are based on a speed of conversation equal to four times the speed of morse transmission. The average speed of conversation is 125 to 150 words per minute and the average speed of morse sending is 30 to 40 words per minute. The traffic capacity of one telephone circuit is equal to four straight morse circuits, two duplexes or one quadruplex. The difference in labor costs is as follows:

Eight Morse Operators at $65.00 per month	$520.00
Two Telephone " " 30.00 " "	60.00
Difference per month	$460.00
Difference per year	$5,520.00

The lower terminal operating costs in the case of the telephone offset a considerable annual charge on the more expensive line circuit. On the basis of a 1,200 mile standard of transmission, the telephone is more economical than four straight morse wires for distances up to 1,650 miles; it is more economical than two duplex morse wires for distances up to 1,200 miles; and it is more eonomical than one quadruplex for distances up to 900 miles.

*Fourth article of paper read before Association of Railway Telegraph Superintendents at Chattanooga, Tenn., May 17, 1905. Copyright 1905 by Frank F. Fowle.

The economy of a simplexed telephone circuit, with the morse side working quadruplex, as compared with two quadruplex circuits, is such that it is the most economical arrangement for distances up to 1,200 miles or a trifle less than this if there are many intermediate exchange switchboards.

The conclusion is that economy in wire use consists in building moderate-haul telephone lines for simultaneous use, arranged to handle the long-haul business by telegraph. When there are special uses for long-haul telephone circuits, they are no more expensive than morse circuits, except for very long hauls above 1,200 miles. On railroad lines where the traffic of transportation is light or moderate, and where one train dispatching circuit and one combined business and commercial circuit are sufficient, the business can be handled most cheaply by telegraph. The very long haul traffic, also, can be handled by telegraph most cheaply. On railroad lines where there is heavy transportation traffic, it is usually the case that the traffic of communication is correspondingly large, and this is the economic field of the telephone, worked simultaneously with the telegraph.

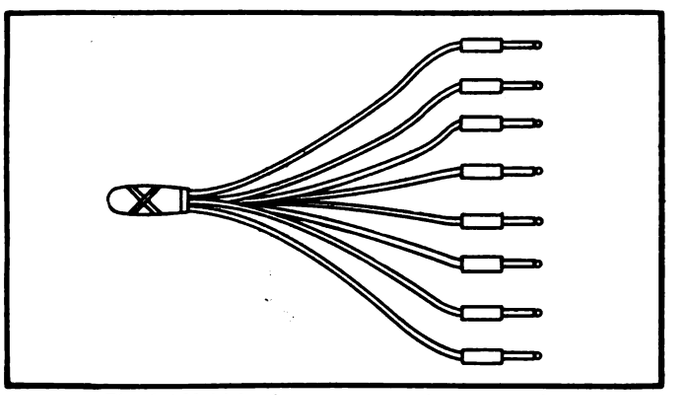

Fig. 6. Multiple plug arrangement (see page 191).

Records of Traffic and Wire Trouble.

Traffic records are of value—as applied to the mail, the telegraph and the telephone—in preventing abuses of the service and keeping the various classes of traffic in their respective channels, in detecting parts of the wire plant which may become idle through changes in organization or traffic methods, and in ascertaining when circuits are overloaded and additional facilities needed. Telephone traffic records should show date, time, origination, destination, reason for delay, length of connection or for what reason it was not established and the names of the parties or departments. Telegraph traffic records should show the date, time received, filed and transmitted, at the origination; at the destination should be shown the time received, filed and delivered. Mail records should show the date, origination, destination, train number and the departments between which the communication passed.

Traffic summaries should be prepared in two ways, one showing the daily message load on each office and the other the daily message load on each circuit.

Records of wire trouble are useful to show causes for traffic delays and also to detect bad construction, bad line conditions or lack of prompt location and removal of trouble.

Line maintenance is an important question and it is economy to employ a force sufficient to clear trouble promptly. Trouble on trunk lines and long circuits should be cleared before local office troubles, if there is necessity for a choice. If a 100 mile circuit is in trouble, on which the total annual charge is $10.00 per mile or a daily charge for 100 miles of $2.74, it is obviously economy to get the section linemen to the trouble very promptly. This point is more strongly emphasized by the attendant delay to traffic and congestion of business.

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Crossings with High-Tension Power Transmissions.

The growing commercial importance of transmitting power electrically, over transmission lines operated at pressures as high as 33,000 volts—and in the far West even higher—emphasizes the danger of such lines. The general question of the joint occupancy of pole lines and subways by telephone, telegraph and power systems is well set forth in the "National Electrical Code," of the National Board of Fire Underwriters. Class E, "Miscellaneous," Rule 64, on "Signalling Systems" and Class B. "Outside Work," Rule 12 on "Wires," and Rule 12A on "Constant-Potential Pole Lines, Over 5,000 Volts," apply to all telephone and telegraph work. The telephone companies are making extensive application of various methods for protecting aerial crossings with high tension lines. Some of these methods have been described in the technical press—"Electrical World and Engineer," May 21st, 1904, by Robert E. Chetwood, Jr.—and are well worth using where the conditions permit them. Standardization of crossings is not feasible on account of the wide range of conditions to be met, but there should be a universal policy in regard to providing screens between the lines or going underground with one line, and also in regard to the minimum mechanical strength of wires, poles, cross-arms, pins and insulators.

Existing Railroad Telephone Systems.

The following railroad systems have extensive telephone systems, including lines of considerable length: New York Central and Hudson River Railroad, Lake Shore and Michigan Southern Railway, Illinois Central Railroad, Lehigh Valley Railroad, New York, New Haven and Hartford Railroad, Delaware, Lackawanna and Western Railroad, Chicago, Burlington and Quincy Railroad, Pennsylvania Railroad, Pennsylvania Company, Chesapeake and Ohio Railway, Baltimore and Ohio Railroad, Northern Pacific Railroad, Pittsburg and Lake Erie Railroad and Long Island Railroad.

The largest gauge wire is No. 8 B. W. G. and the smallest is No. 10 B. & S., for aerial work. Considerable use of composite and simplex systems is made. The longest transmission is from New York to Chicago, 960 miles, over the New York Central and Hudson River Railroad and the Lake Shore and Michigan Southern Railway. The total mileage of telephone circuit is approximately 6,000 miles, excluding very short lines and station circuits.

(*Concluded.*)

Appendix—Wire Table.

Lbs. per mile of copper wire	Gauge. B. & S. G.	B. W. G.	N. B. S. G.
10.2	No. 22		
12.5		No. 22	No. 22
13.	No. 21		
16.4	No. 20	No. 21	No. 21
19.6		No. 20	
20.7	No. 19		No. 20
25.6	No. 18		No. 19
28.2		No. 19	
32.	No. 17		
36.8			No. 18
38.4		No. 18	
42.	No. 16		
50.			No. 17
52.	No. 15		
54.		No. 17	
65.	No. 14		No. 16
68.		No. 16	
83.	No. 13	No. 15	No. 15
102.			No. 14
105.	No. 12		
110.		No. 14	
132.	No. 11		
135.			No. 13
144.		No. 13	
166.	No. 10		
173.			No. 12
190.		No. 12	
208.	No. 9		
215.			No. 11
230.		No. 11	
262.	No. 8		No. 10
287.		No. 10	
331.	No. 7		No. 9
350.		No. 9	
409.			No. 8
419.	No. 6		
435.		No. 8	
495.			No. 7
518.		No. 7	
529.	No. 5		
589.			No. 6
659.		No. 6	
665.	No. 4		
718.			No. 5
777.		No. 5	
838.	No. 3		
860.			No. 4
1064.	No. 2		
905.		No. 4	

Tie Trunk Circuits

By Leo S. Herzog.

THE increasing demand for telephone service has necessitated the design of special circuits in order to facilitate operation. To enable a subscriber to get a direct communication with another instrument without calling the central office; connecting circuits called tie trunks have been devised. These not only save time, but also money, as they constitute a private line, which is without the supervision of the exchange and can consequently be used ad libitem without extra charge.

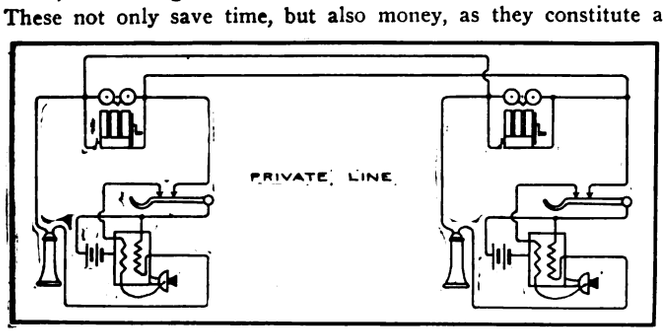

Fig. 1.

The following sketches illustrate different tie trunk circuits, which are adapted for various conditions.

Fig. 1 shows two magneto instruments with local batteries feeding each instrument. This circuit is one that is not used very extensively at the present time, owing to the fact that batteries require some little attention from time to time, and owing to the impracticability of connecting these instruments on another line.

In Fig. 2 *A* are shown two switchboards, which are in the same local districts, having the line resistance low enough that an extension signal can be raised at *y* by inserting the plug in the jack at *x*. When switchboard *y* wishes to call *x*, the operator plugs into the extension jack and presses her ringing key. This throws generator current on the line, which causes the

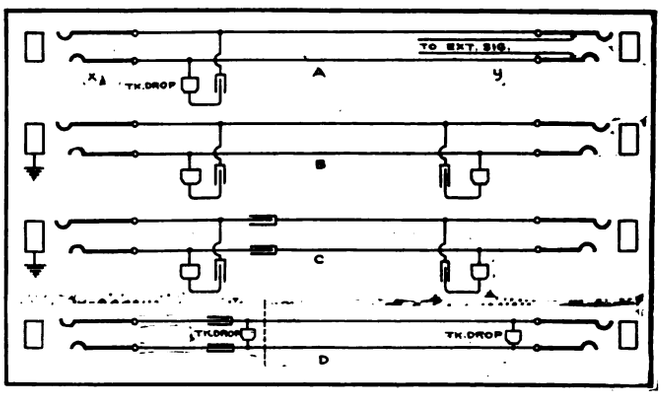

Fig. 2. A, B, C, D.

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shutter of the trunk drop at *x* to fall. In talking, battery is fed from *y*, which is sufficient for both transmitters.

Fig. 2 *B* illustrates two switchboards with a connecting trunk terminating at a drop at each end. The ground of the jack is cut on one of the switchboards in order that battery will only be fed by one of them. This circuit is practically the same

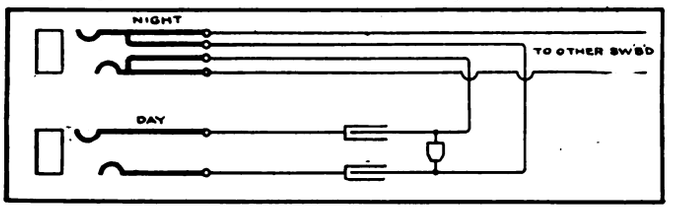

Fig. 3.

as No. 2 *A*, with the exception that both ends of this circuit terminate at drops. It is better than No. 2 *A* for all practical purposes, owing to the fact that if by mistake the operator should press the ringing key, after inserting the plug at *x* in Fig. 2 *A*, the generator would pass over all the local extensions at *y*, causing all the bells to ring.

In such places where the switchboards are located in different districts, it is necessary to furnish battery from both boards in order to get good transmission.

Fig. 2 *C* represents two switchboards existing under this condition with a condenser in series with each side of the line. There is no material difference at which board they are placed, although different engineers have different ideas on the subject. In some instances they have been placed at both boards. The use of condensers in this case is to prevent battery flowing through the circuit from one load to the other.

Fig. 2 *D* represents a circuit in which the drops are placed directly across the line, so that the operator does not have to ring through the condenser. The drop resistance being very high, practically no current flows through it while a conversation is in progress.

Fig. 3 is a circuit which may be used in day time in the usual manner, and can be plugged up at night to an extension instrument without throwing the drop on the switchboard to which it is plugged. When used for this purpose a hand generator with a shunt to open the armature is bridged across the extension line so that a party can call the main switchboard.

With the exception of Fig. 1 all of these circuits are adapted for common battery systems.

Low Rates for Service in Stockholm, Sweden

By J. Sitzenstatten.

RATES for telephone service in Stockholm, Sweden, are possibly the lowest in the world when the number of subscribers is considered. In all there are three systems—the Allmänna (General), the Bell, and the Government (Rikstelefon). The rates for different classes of service are given in the accompanying table. A peculiar classification of service is employed by the General Company which is unique. Those subscribers which are marked with a star pay the highest or first-class rate. Subscribers of the absorbed Bell Company, who otherwise have only a right to 100 calls per quarter for their regular subscription rate, can talk to these star subscribers without paying the 2.7 cents extra, which they have to pay for any other call, once their 100 calls are exhausted.

Thus, for instance, a groceryman, butcher, or, in fact, any tradesman, finds it to his advantage to become a star subscriber, knowing that the number of calls to his place from all classes of subscribers is unlimited, while, for instance, a lawyer or an architect who has the telephone more for his own personal convenience than to receive daily orders on it, can get along with the second-class (not starred) instrument, which costs him $6 less per year.

The equipment of all classes being exactly the same, the company does not punish a subscriber who pays for a high-rate metallic circuit, L. D. and what not else service, by hitching him onto some poor, obsolete, half brken down, single battery, Bell-Blake, grounded line of a cheap rate subscriber, as is the case in the majority of Bell exchanges in the United States and of which the one in the City of Mexico is a fair sample.

The one to four cipher system as against the five and more cipher plan is another interesting feature of the Stockholm Allmänna Company. The higher rate subscribers' numbers never exceed four numbers. It is a well-known fact that everybody strives for the lowest number in the catalogue, partly because the lower the number the easier it is to remember, partly because it saves time and mistakes. In a city like Stockholm, where, thanks to the excellent technical arrangements, almost all the subscribers are connected up in one central exchange, some subscribers must necessarily get very high numbers, running into five figures), and here the company put in another little wedge to induce people to take the better class of service, by giving all the cheap rate subscribers (two-party lines) the numbers above 9999. The scheme works very well, and when one has had a large number of subscribers to handle he must admit that there is lots of common sense in this arrangement.

It may be interesting to note that in Stockholm every sixth person, counting men, women and children, has a telephone. The

Allmänna (General) Company:	
(*) *Subscribers,* one on a line, 1 to 4 ciphers in the subscriber's list	$27.22
Other subscribers, one to a line, 1 to 4 ciphers in the subscriber's list	21.33
Two party line, 5 ciphers in subscriber's list	16.00
Second instrument on same line in same house, same subscriber's contract	8.00
The two-party lines are arranged in a manner that both subscribers enter the exchange on different lines, but are bunched at the switchboard in one jack, thus saving the company switchboard space.	
Bell Company:	
Business telephone (only one on a line)	$12.00
With a right to 100 calls per quarter from the subscriber's instrument and 2.7 cents for each call above that figure.	
Residences: Same conditions as above	$9.60
Government System (Rikstelefon):	
Business telephone ($13.33 for installation) and yearly	13.33
Private residences (no charge for installation), yearly	13.33

Rates of different companies operating in Stockholm, Sweden.

Allmänna Company in its Subscribers' List No. 28, published March, 1905, shows the following number of instruments:

Allmänna Company's instruments	25,383
Bell Company's (absorbed)	12,510
Total subscribers	37,893

The Allmänna started in 1883 with 571 subscribers, and had 5,713 in 1891, when the fusion with the Bell Company took place. This increased the total number of subscribers to 6,909. Since that year a steady increase of about 2,000 per year has taken place, in spite of the competition of the Government.

The Government has at present about 10,000 instruments, which makes up the phenomenal sum of nearly 48,000 subscribers in a city of about 300,000 inhabitants.

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Telephone Traffic*

By Herbert Laws Webb.

THE improvements in telephone exchange apparatus during the past ten years have been revolutionary. The history of telephone exchange working, covering now about twenty-five years, may be roughly divided into two periods: one of about sixteen years, in which the apparatus was mainly experimental and many different systems were tried, but none was produced capable of dealing with a large daily traffic with real accuracy, and one of about eight years, in which there has been perfected and standardized apparatus, largely automatic in its working, capable of the greatest accuracy and rapidity in operation.

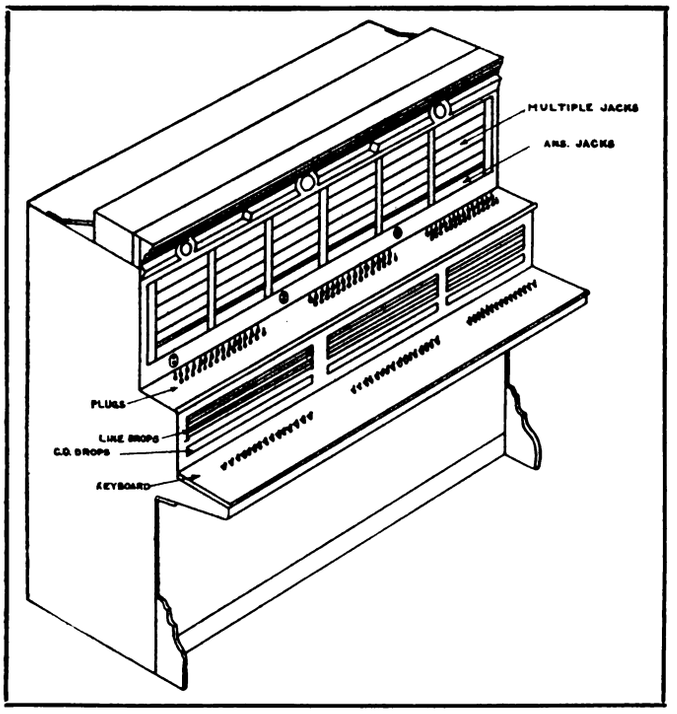

Fig. 1. Series magnetc board. Drops restored by hand and placed in separate part of board from jacks and cords.

In the old apparatus the percentage of error was very great, owing to the distances between the signals and the jacks and plugs they were related to, and owing to lack of definiteness in some of the signals; on many occasions they worked at the wrong time and on others they failed to work when required to. With regard to rapidity of operating, the old apparatus was relatively slow in working for a variety of reasons. The distance between the signals and the jacks and plugs imposed a certain strain on the operator's attention and memory, the replacement of signals occupied time and the lack of definiteness of some of the signals and the total absence of some essential signals necessitated a certain amount of supervision of each connection by one or more operators to insure a reasonably accurate and satisfactory service.

In the standard apparatus of to-day all these conditions have been changed. The use of lamp signals enables many things to be done which were impossible before. The prime advantages of lamp signals are that they are extremely compact, they have no working parts, and therefore may be placed in any position, vertical, horizontal or at an angle; they are automatic in action or self-effacing, since the signal disappears immediately the current is cut off; and finally they give a much more positive and assertive signal than any form of indicator. These various qualities enable several radical improvements to be made. The signals are placed immediately adjacent to the jacks or cords they control, which, in large switchboards, is impossible with electro-magnetic indicators; the line lamp is immediately above or below its corresponding answering jack and the supervisory lamps are in line with the connecting cords and close to them. With this arrangement the operator loses no time and has to exert no brain-power in tracing the relation between the signal and its corresponding jack or cord. The difference in effect between the modern arrangement of directly associating the signals with their corresponding jacks and cords and the old arrangement of placing the signals in a separate part of the board from that occupied by the jacks and cords, is something akin to the difference between a telegram in plain language and one in code. In the one case the meaning of the signal flashes instantly to the brain of the operator and in the other case a certain effort and a certain interval of time are required for translating the meaning of the signal. The automatic working of lamp signals is of much wider range than that of electro-magnetic signals. We had self-effacing, or automatically restored, indicators before lamp signals were introduced. But the self-restoring indicator had but two positions—only two words in its vocabulary, so to speak. The lamp signal has several; it may be alight or out, corresponding to the down and up positions of the indicator, but it may also flash and it may be made to flash at different rates of speed easily recognizable. Therefore, apart altogether from the fact that it is much more easy to apply to lamps distinctive marks indicating different classes of service than it is to apply such marks to indicators, the lamp signal is able to convey a greater number of meanings as a working signal than an indicator. Finally, the more assertive and positive signal given by a lamp as compared with an indicator is due to a simple physical fact—the great sensitiveness of the eye to light. The glowing of a lamp signal instantly attracts attention, no matter at what angle the lamp may be relative to the eye, and in many cases the lamp is seen instantaneously where a fallen drop would be unnoticed for several seconds. The lamp is seen out of the corner of the eye, so to speak, whereas an indicator must be more directly in the range of vision. The diagrams,

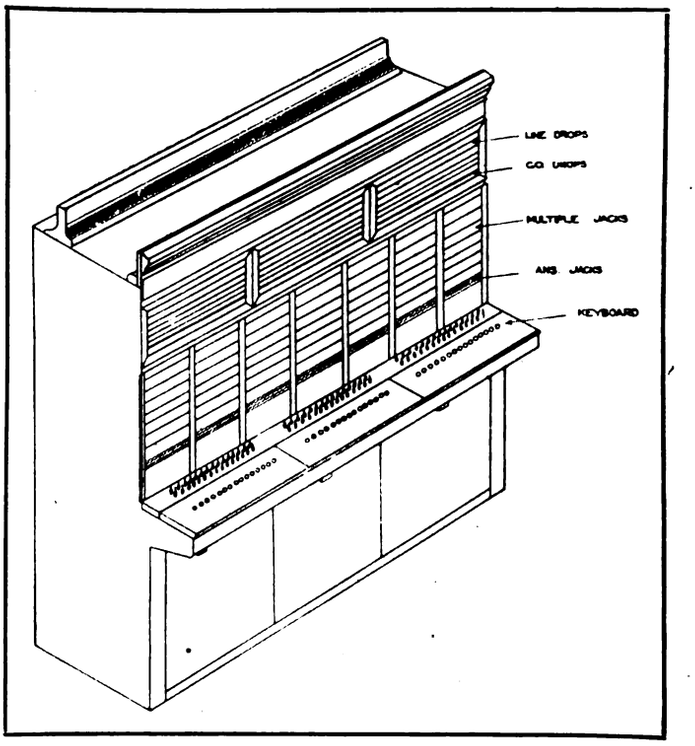

Fig. 2. Bridging magneto board. Self-restoring drops, but still placed apart from jacks and cords which they control.

* Extracts from paper read before the British Institution of Electrical Engineers.

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Figs. 1, 2 and 3, illustrate the relative positions of the signals and jacks in the three chief types of multiple switchboard.

Perhaps the most striking improvement in operating resulting from the use of lamp signals and the supply of energy from a

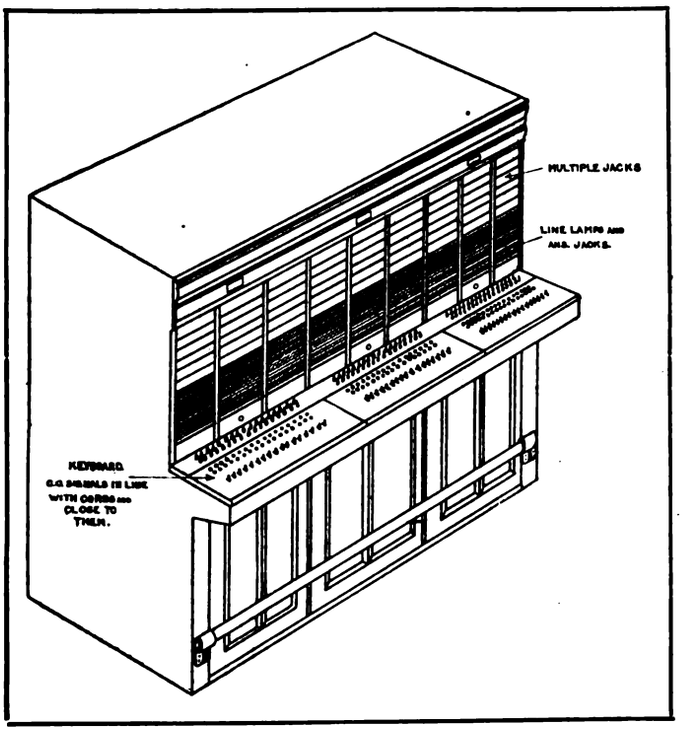


Fig. 3. Relay board. Automatic lamp signals placed immediately adjacent to jacks and cords which they control.

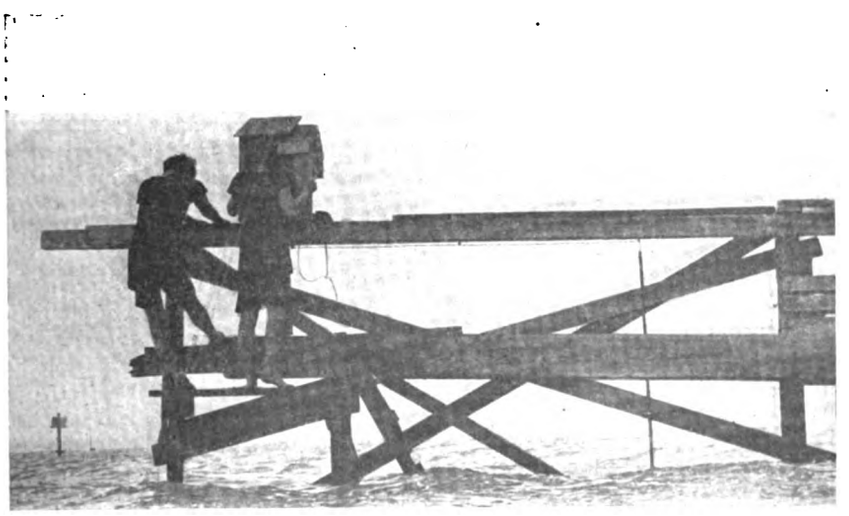
central source is automatic supervision. In the older systems of working, as has already been said, the indefiniteness and unreliability of the signals made it necessary, in order to reduce as far as possible the percentage of error, that the operator should give each connection a certain amount of supervision. This supervision was directed to ascertaining that the two subscribers had got together all right, and later, in the many cases where the disconnection signal was not given of ascertaining whether the subscribers had finished talking and the lines could be disconnected. This supervision demanded a certain amount of the operator's time on each connection in excess of the time actually required for the operation of the connection. In the modern switchboard the exact condition of the two subscribers' lines connected is shown by the state of the two supervisory lamps associated with the connecting cords. By the automatic working of these two signals the operator knows when the called subscriber answers, she knows when one subscriber hangs up and the other does not; she knows if either subscriber wants her to come in on the line, and finally she knows when the two have hung up. The operator sees these various conditions of the line by the action of the two lamps, and she requires to do no direct supervision. If either subscriber desires to attract her attention he flashes one of the supervisory lamps by moving his switchhook up and down and it is only on this signal that the operator goes in on the circuit. The automatic supervision and the automatic and definite disconnection signal afforded by the double supervisory signals constitute an immense advance in the means of handling telephone traffic.

In the working of trunk lines—a branch of the operating which is of the highest importance in large systems, since the greater proportion of the traffic passes over the trunks—great improvements have been effected by modern apparatus and methods. The use of lamp signals affords what was lacking before, a positive disconnection signal at the incoming end of the trunk. The absence of such a signal was formerly responsible for many operating errors and for much extra work and waste of time. The existence of the supervisory lamp on the cord at the answering position enables the incoming junction operator to signal back automatically to the answering operator if the line wanted is engaged or out of order.

(To be continued.)

A TELEPHONE STATION ON THE GREAT SALT LAKE.

ONE of the most unique locations of telephone apparatus in the world is situated on the Great Salt Lake, two-thirds of a mile from the summer resort of Saltair in Utah. The instrument, which is of the ordinary pattern, is mounted in a box on the top of a pile, about which has been built a platform. In the accompanying illustration a bather is shown availing himself of the opportunity to talk to some friend in town. In fact a bather may call up any point he may wish provided he is willing to pay for the connection. The splash of the waves, if the wind is blowing, can be heard, as well as the shouts of the bathers at any point on the system of the Rocky Mountain Bell Company, which installed the instrument, when the lake connection is open.



The telephone is connected by heavily insulated No. 18 twisted wires, through an half inch iron pipe, with the nearest point of the bathing pavilion, the wires being stretched along the roofs of the bathhouses to the main Saltair pavilion, where there is an ordinary exchange switchboard of the standard common battery pattern. Through this switchboard connections are had with Salt Lake and thence to any point desired.

Besides affording amusement, this telephone furnishes a ready means of communication with the beach in case of accidents. Should a bather be overcome by cramps or other illness, any one nearby can call for aid and secure the services of a doctor by the time the injured party reaches the shore. This telephone has been used on more than one occasion to transact important affairs, and business men who happen to be in bathing find it a great convenience to be able to talk to their offices, without having to delay till they have dressed and gone to one of the regular stations on land.

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THE EDITOR'S PAGE

THE DEVELOPMENT OF AUTOMATIC DEVICES.

IN no field more than telephony is there to be found so abundant a use of automatic devices. It would be difficult to point to any other system devised by human intelligence which so betrays the influence of systematic development. At first glance the complexities of the most modern types of telephone systems appear beyond the power of ordinary minds to adequately comprehend; but it is only too well known by the representatives of this department of engineering that the constant duplication of parts invites this opinion. That the hugeness of the machine, as a whole, is made more startling in its extraordinary appearance by the variety as well as the quantity of parts comprising it is natural enough. The point of inquiry, however, awakened by a contemplation of the vast organization in operation in any large city is "how the system works so uninterruptedly."

It is in this respect that the influence of automatic devices can be regarded as the means by which development of this industry became so rapid. It must be conceded that the old-time system was crude and ineffective, as well as slow, compared with the present. The difference between telephone systems of fifteen or twenty years ago and to-day may be traced with little or no difficulty to the introduction of automatic devices.

This is the age of automatic machinery because it is a time-saving and money-making age. The ramifications of the most modern of our telephone systems and the exchanges where these ramifications centre are only possible because automatic elements have been introduced. They have solved the problem of expansion by increasing the scope, yet lessening the labor of operation. It seems, from a casual view of the situation, that in all probability the highest stage of development has and will be reached in this respect by the telephone before other systems.

SOME FINANCIAL FEATURES.

OUTLAY in telephone systems comprises the running expenses, the wear and tear and the cost of extensions. Receipts comprise the cash obtained from public telephones and the returns from bills collected for regular service. Striking a balance between the two is supposed to yield the profit for the month, quarter, six months or fiscal year. To the lay mind the proposition is simplicity itself, yet it would not be too radical to suggest that the financiering of a large telephone company, though falling within the scope of ordinary financial and commercial methods, is on account of the numerous branches of the business involved, to be classed without argument as a task calling for clear headedness and skill of an unusual character on the part of the official serving in this capacity.

In all large enterprises, large because of the numerous departments included as well as the amount of business transacted, the policy, or *deux machina*, must go hand in hand with the financial methods employed. In other words, a fruitful policy will be the means of securing financial solidity. By this is meant a form of management aiming at the preservation of present subscribers as well as attempting to increase the list. By this is also meant a management which watches the system as far as repairs and drawbacks are concerned. For this reason, in a sense, the financier of a telephone company must be wide awake to more than the ordinary financial conditions. The rapidity with which deficiencies are corrected will be, to a large extent, the measure of financial success.

Napoleon believed in treating all problems broadly, but he kept in touch with every detail. The financial management of a telephone system belongs most emphatically to this category. Applying all the rules in the world will not spell success, unless their application yields the bonus expected of wise management; and this is only possible if such rules are far reaching enough to teach the employee to do his duty. Many subscribers and dutiful employees are almost synonymous, to the same extent that good management and good financing are practical equivalents.

THE DESTRUCTION OF CABLE SHEATHING.

THE life of cables is largely determined by the rate of deterioration of their insulation and protective covering. The covering, in fact, is most apt to undergo a slow process of destruction, the effects of which are necessarily arbitrary in character. The degree of injury experienced by telephone cables, as far as their sheathing or outer covering is concerned largely depends upon extraneous and local conditions. These conditions are the consequences of carelessness on the part of those entrusted with the superintendence of street railway and electric light systems. Of the two systems the former is in all likelihood the most basic cause of the injuries sustained by cables whose protective coverings are electrolytically affected.

The limitations of these evil consequences of neglect or false economy by those responsible for the well being of street railway systems are not entirely found in iron or lead pipes laid in or near moist soil. Iron building foundations are apt to suffer, and it has frequently been claimed that the terminal supports of Brooklyn Bridge have deteriorated through the influence of stray currents. The conditions leading to this highly dangerous state of affairs are: First, insufficient feeding circuits in the return of the rail circuit; second, bad connections between the feeders and rails or the rails themselves. In either case a heavy leakage results, the cumulative effects of which are readily visible in the course of time in pitted and scarred cable coverings. It is self-evident that conduits buried in earth are not dry. It is equally apparent that with enough moisture and the cable acting partly as the anode of an electrolytic cell, metal will be torn from the leaden or iron covering and carried to the other pole. A practical problem of this character is therefore only solved by first carefully insulating the cable from external influences; second, securing good electrical contact between the rails of any adjacent track, and, third, by supplying enough feeders to the track and trolley to make them act as the elements of the circuit instead of any part of the ground.

The telephone companies, however, have really no recourse but to provide insulation for their cables of the most reliable nature. Conduits that can be kept comparatively free from an excess of moisture or wet are the best engineering solution to this problem. No other method of relief is reasonable or advisable, in the light of the fact that it is expected in the power house that a heavy percentage of the power will leak away, and that despite the most rigorous precautions the earth will carry sufficient electrical energy to make rapid inroads upon many unprotected conductors in its path. Getting at the cause of this injury legislatively is only temporizing with the truth. In the course of time perhaps the evil would be remedied. Until that period arrives, however, electrolysis can be best avoided by using safe conduits. If these are well joined, impervious to moisture, well drained and properly laid, little or no complaint is likely to issue on the score of electrolytic destruction in any shape or form.

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The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

TEXAS CONDEMNATION LAWS.

Will you please give us what the Texas laws are with regard to condemning railroad right of way for telephone lines, also the method of procedure and probable cost per mile? A. T. Co.

TELEPHONE companies may by the Texas laws condemn railroad rights of way for telephone lines. This answer is based upon the following statutes and decisions: A telephone company is entitled to condemn a right of way that has been previously condemned for the construction of a railroad for the erection of a telegraph line where such line will not destroy the use of the way for the railroad.

Sayles' Civ. St., Art. 699, giving companies operating the "magnetic telegraph" a right to appropriate lands necessary for the erection of its poles, includes telephone companies as well as telegraph companies.

S. W. Telegraph Co. v. Gulf C. & S. F. Ry. Co., 52 S. W. 106.

Rev. St. 1895, Tit. 21, c. 7, giving "telegraph companies" power to exercise the right of eminent domain, applies equally to telephone companies. Gulf, C. & S. F. Ry. Co. v. S. W. Telegraph & Telephone Co., 45 S. W. 151, 18 Texas Civ. App. 500.

The telephone being a new species of telegraph, the right of eminent domain conferred on telegraph companies by Rev. St. 1895, Tit. 21, c. 7, is applicable to telephone companies, although the latter are not mentioned in the statute.

Rev. St., Arts. 698, 699, providing that corporations created for the purpose of constructing and maintaining magnetic telegraph lines may set their poles, etc., upon public roads and authorizing proceedings to condemn lands for the use of such corporations apply to like proceedings by telephone companies organized under Rev. St., Art. 642, Subd. 8, authorizing corporations for the construction of "a telegraph and telephone line."

San Antonio & A. P. Ry. Co. v. S. W. Telegraph and Telephone Co., 55 S. W. 117, 93 Texas 313.

The method of procedure will be found in the statutes cited above, the rules of court and methods of practice in your State. We cannot outline it in the short space of this article. It will have to be obtained from your local attorney. We cannot give probable cost per mile because it depends largely upon the judgment of a jury as to the damages suffered by the railroad company as a result of your using its right of way.

RETURN OF CONSIDERATION FOR DEED UNDER SEAL.

SUIT was brought against the American Telephone and Telegraph Company by one Phillips for $1,000 damages, the plaintiff alleging that in the construction of its line through his land in Cherokee county, S. C., the company had cut a swath 18 feet wide through his woodland and had trampled down his sown wheat. The defendant introduced a deed from the plaintiff, giving it a right of way over his land. The company also contended that its entry was with the knowledge and consent of the plaintiff, that there was no proof that the plaintiff had made a demand for compensation and that in such case an action for damages was not the remedy, the remedy by condemnation proceedings being exclusive.

The plaintiff averred that he had been paid nothing for the deed, which the company answered by saying that the deed, being under seal, the payment of the consideration was presumed. The court held that the company had erected its lines outside of the way granted to it and that the remedy was therefore an action for damages. Though a seal is prima-facie evidence of consideration for a deed, and if no consideration is expressed the seal will be sufficient, the court decided that the principle did not apply when the question was whether the grantor should return to the grantee the consideration received before repudiating the deed for fraud. Phillips vs. the American Telephone and Telegraph Company, 51 S. E., 247.

ATTEMPTED FORFEITURE OF FRANCHISE FAILS.

EAST PITTSBURG, PA., has lost its suit to forfeit the franchise granted within the borough limits to the Pittsburg & Allegheny Telephone Company. Judge Young dismissed the bill filed by the borough with the costs of the latter.

In October, 1903, the East Pittsburg council passed an ordinance granting the defendent company the right to construct its system within the borough. Part of the consideration for the franchise was free telephones for the borough officers and the use of the company's poles for their police and fire alarm wires. The borough officials now say that the telephone company has not complied with the terms of the ordinance, and that the only subscriber to the service within the year in which the system was to be completed was the Westinghouse Electric & Manufacturing Company.

Judge Young finds in his conclusions of law that the telephone company was within a year not only ready but was giving telephone service as required by the ordinance; that it was not necessary for the company to place its poles, lay its conduits, string its wires, establish its exchanges or do any work of construction within the borough until it had obtained the subcribers and that in order to hold the company to a breach of the conditions providing free telephones and space for cross arms. etc., on the poles, council must make a request for same and designate where the telephones are to be placed as well as the cross-arms. The attempted withdrawal of the permission given the telephone company to operate its system in the borough Judge Young says is illegal and void.

A TELEPHONE COMPANY MAY DO ELECTRIC LIGHTING BUSINESS.

THE Court of Appeals of Maryland has held that the Maryland Telegraph and Telephone Company of Baltimore City has the right to conduct an electric lighting business in Baltimore. The company was organized under the law of 1888, which provides for the formation of telegraph or telephone companies and for the transaction of any business in which electricity might be applied. It was held necessary for the company to have obtained the approval of the city council of Baltimore before using its streets, but this the company had not done.

Brown v. Maryland Telephone & Telegraph Co., 61 Atlantic 338.

OBSTRUCTION OF SIDEWALK.

IN an action against a telephone company to recover for injuries received by falling in the night time from a pile of stones left on the sidewalk, where the evidence showed that the telephone company had secured a permit to lay conduits in the street and had piled the paving stones on the sidewalk, the Supreme Court of Pennsylvania held that a judgment for the plaintiff was justified.

White v. Keystone Telephone Co., 60 Atlantic 998.

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IN THE OPERATING FIELD

INDEPENDENT COMPANIES DENY CONTEMPLATION OF SALE TO BELL.

NUMEROUS reports emanating from Bell sources throughout the country to the effect that Independent companies had either sold out to Bell interests or contemplated doing so, have been appearing in the newspapers and the electrical press during the past month. To get at definite facts in the matter the National-Interstate Association placed itself in communication with the different companies reported and the following replies have been received by telegraph and letter:

Connersville, Ind., July 30, 1905.

Jas. B. Hoge, Cleveland, Ohio.

No truth in rumor of any deal with Central Union.

L. A. FRAZEE.

Lorain, Ohio, August 18, 1905.

Mr. John A. Harney, Asst. Secretary, N. I. T. A., Cleveland, Ohio.

Dear Sir—We received your letter in which you quoted the "Western Electrician" about the Bell Telephone Company purchasing the Black River Telephone Company.

We wish most emphatically to deny this statement. We have not negotiated with the Bell Company, and have never received an offer from them. We wish also to state that the Black River Telephone Company is not for sale. Yours very truly,

THE BLACK RIVER TELEPHONE CO.,
A. V. HAGEMAN, Treasurer.

Lorain, Ohio, August 19, 1905.

Mr. John A. Harney, Asst. Secretary, N. I. T. A., Cleveland, Ohio.

Dear Sir—Replying to yours of the 15th inst., beg to advise that so far as our knowledge extends, the Bell interests are not seeking at the present time to purchase Black River Telephone Company, and, it is my opinion, our people do not care to sell their property.

Yours truly, E. M. PIERCE, President.

Los Angeles, Cal., August 25, 1905.

Jas. B. Hoge, President N. I. T. A., Cleveland, Ohio.

Dear Sir—I have your favor of August 14th relating to a possible tie-up with the Bell Company. I can say, too, and from the fullest knowledge, that there is not the slightest chance for such a deal. It is impossible. All the stock of the Los Angeles Home Telephone Company is pooled for ten years, and the same condition exists for most of the companies in California, as well as the long distance. I think the rumor comes from the fact that the Bell Company have been, and are now, circulating petitions asking subscribers to sign, asking a consolidation. They do not admit they are the source of the petition, but we know they are.

You may deny emphatically the rumor of possible consolidation or connection of any kind. I am, Yours truly,

JOHN VAN LIEW, General Manager.

CLINTON, N. Y., HOME COMPANY ERECTS NEW EXCHANGE BUILDING.

FOR many months past the Clinton, N. Y., Home Telephone Company has been at work on improvements, among the most important of which is the new building which it has erected. The company has expended about $25,000 in the improvements and now has a system and exchange which is strictly modern and first class in every respect. The old system became entirely inadequate for the growing business of the company, which in the last ten years has grown from the first exchange, with about half a dozen telephones to the present one with over three hundred in the village and vicinity.

The new exchange building is brick, with stone trimmings, and is semi-fireproof in construction, with a frontage of eighteen feet and a depth of about forty-four feet. The entire first floor is occupied by the switchboard, public toll and general offices. The basement is used for storage and a workroom and opens in the rear on a level with the ground. The cables come into the basement from the street and are carried up through the floor to the distributing frame.

The directors of the company are: President, G. J. Cauldwell; treasurer, C. D. Hayes; vice-president, T. Harvey Ferris, secretary and manager, M. Stanley Powell; H. S. Powell and G. R. Fuller.

The policy of the company will be to broaden out as necessity demands and to keep up the best possible service at as low rates as is consistent with good service.

REMARKABLE LONG DISTANCE DEVELOPMENT IN INDIANA.

THE New Long Distance Telephone Company, of Indianapolis, has developed its system to such an extent that with but few exceptions it reaches every point in the State of Indiana and has connections with Baltimore, Md., Topeka, Kan., and from Canada to Nashville, Tenn.

The New Long Distance Telephone Company has on its own lines in the counties within a radius of fifty miles of Indianapolis 61,633 subscribers. Of the 11,541 subscribers to the Indianapolis Telephone Company who are connected with its lines, 9,905 use no other telephone and the list is rapidly growing.

EARNINGS
of the
Independent Telephone Companies
OF INDIANA
Year Ending April 1, 1905

Gross Earnings, - -	**$2,430,191.00**
Gross Expense, - -	**$1,847,763.00**

NET EARNINGS, $583,428.00

The company is capitalized at $1,000,000 under the laws of Indiana, and the controlling interest is held by Indiana people.

50 Per Cent.
Independent Telephone Investment
IN INDIANA

For the Year Ending April 1, 1905, as Shown by the Tax Reports to the AUDITOR OF STATE

Increased - - - $3,897,242.00

April 1, 1904, Total Invested, $7,708,631.00

April 1, 1905, Total Investment, $11,605,873.00

The officers of the company are: Louis Hollweg, president; A. F. Ramsey, vice-president; H. B. Sale, secretary and general manager; J. D. Wiest, treasurer. The directorate embraces the foregoing and the following named gentlemen: Louis C. Reese, Jesse W. Weik, A. K. Hollowell.

In a recent Sunday issue of one of the Indianapolis papers this company carried a page advertisement which attracted attention throughout the state and demonstrated its ability to furnish quicker and better service than is possible over Bell lines.

REPRESENTATIVES OF HOME COMPANY REPORT TO OAKLAND, CAL., MERCHANTS' ASSOCIATION.

TWO representatives of the Home Telephone Company of Alameda county were in attendance at a recent meeting of the Merchants' Exchange directors.

Being asked what the approximate cost of the new telephone

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would be, they stated that it would probably amount to $2.50 for resident telephones and $5 per month for business telephones. They also promised that money to the amount of $250,000 would be expended the first year in installing and equipping their service, and that during the second year $500,000 and during the third $850,000 would be paid out to improve and perfect the plant. They stated that in their application for a franchise they had entered a provision that the company was to deposit $1,000 bonds to insure the carrying out of these and other promises.

LOCATING THE FAULTY POINT IN SPLIT PAIRS.

By Adolph Jameston.

TO the wire chief or plant manager who wishes to work his cables to their highest efficiency, there sometimes presents itself a species of cable trouble, which, though not rare, is still not as frequently met with or as easily disposed of as the ordinary cases of grounds, crosses and shunts. I refer to split pairs. A glance at Fig. 1 will show what I mean. Conductors *2* and *3* of pairs *A* and *B* have been carelessly transposed at the point *X*. An attempt is made to remedy this condition later at some other splice in the cable, or perhaps at the main distributing

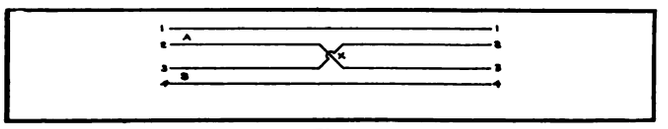

Fig. 1.

frame or extreme end of the run. This brings about a condition as shown in Fig. 2.

In a long cable these pairs, though testing O. K. according to ordinary test table methods or with a voltmeter, will give the worst kind of cross talk if both pairs are used. If only one is used it (especially if a toll trunk is worked on it)will be noisy,

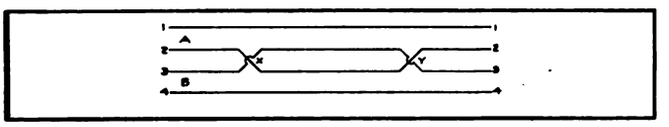

Fig. 2.

due to the unbalanced condition of the pair. Pairs lost in this manner are sometimes very hard to reclaim, for ordinary location methods cannot be utilized.

The writer has employed the following method with much success in locating the point approximately at which the split was made. See Fig. 3. *A* is a pair, perfect the full length of the cable. *B* is the pair under test the side *4* of which is split with the pair *C* at the point *Y*. *D E* is some form of bridge the arms of which can be readily varied. Any of the many forms

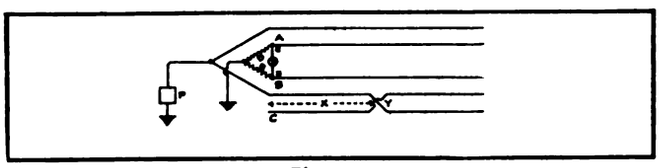

Fig. 3.

described in The American Telephone Journal will answer, using a head telephone instead of a galvanometer connected between *A B*. *P* is a source of vibrating or alternating current (a buzzer such as used for tone testing will do) with one side to ground. Ground junction point of arms *D* and *E* and connect pairs *A* and *B* as shown (Fig. 3). Adjust *D* and *E* until no sound is heard in head telephone. Then

$$\frac{D}{E} = \frac{\text{length of } A \text{ in ft.}}{\text{length of } X \text{ in ft.}}$$

$$\text{length of } X \text{ in ft.} = \frac{E \times A \text{ in ft.}}{D}$$

The formula explains itself from the diagram. For better results this test should be made at both ends and the average taken. It is not claimed that this test is infallible, for many things will cause error in the result. A slight ground on either pair of wires, more than one split in the bad pair, or many laterals tapped on either pair. Still with all these chances for error, it is a much better plan than opening the cable indiscriminately until the trouble is found.

ILLINOIS INDEPENDENT COMPANY IN GOOD FINANCIAL CONDITION.

A RECENT financial statement issued by the Monmouth, Ill., Independent Telephone Company shows that it is in excellent condition. In addition to paying interest on bonds amounting to $1,482, as well as its full current expenses, the company has opened a sinking fund for the redemption of the bonds and has already cancelled six of its treasury bonds. The report shows an increase of 185 subscribers and an increase in receipts of $1,778.50.

RUMOR OF SALE OF MICHIGAN INDEPENDENT COMPANY TO BELL DENIED.

THE report in a Detroit paper to the effect that A. G. Griggs, president of the Copper Range Gas Company and director of the Oakland County Telephone Company, was in Detroit for the purpose of negotiating for the sale of the telephone company to the Michigan State Telephone Company at the time service was secured on him in the suit brought against the gas company by J. W. Martin, is vigorously denied by the telephone company officials here.

They say they have no idea of selling to the Bell interests, and in proof of this submit that they are about to run three copper circuits into their office here for better toll line service between Pontiac and Detroit and between Pontiac and up-State places.

EXTENSIVE GAINS MADE BY CUYAHOGA COMPANY.

PRESIDENT DICKSON, of the Cuyahoga Telephone Company, reports that company keeping up its usual rate of gain. The number of telephones in operation on September 1 was over 18,500. He states that the company will have 20,000 telephones in operation without fail by January 1 next, and he believes that the gain will not stop until the Cuyahoga has over 25,000 telephones in operation. During July the company gained 617, as against a gain of 371 for July, 1904. During the past sixteen months the Cuyahoga has gained 7,904 telephones in operation. From April 1 to December 31 of 1904 the gain was 4,073, an average of 452 a month. From January 1, 1905, to July 31 the gain was 3,831, a monthly gain of 547. This indicates a gain of nearly 100 a month over the figures of 1904. Col. Dickson said that he did not know whether the Cuyahoga would start the payment of dividends on common stock in January, but that the common would certainly pay a dividend some time next year and go on a 4 per cent. basis.

NEWS—WANTED

THE matter contained upon the Message and Operating Field pages of this paper is contributed largely by our special correspondents. We believe, however, that there are many valuable items of telephonic interest which are never brought to the attention of the public. There is no reason why this condition should exist, and the Editor, therefore, invites all telephone companies, and the officials of such companies, to furnish any information that they can consistently make public relative to financial statistics, new construction, elections, franchises and personal items.

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QUERIES

COMMON BATTERY OPERATION.—(600.)

Please illustrate what takes place in central office when subscriber removes receiver from hook. Bell illustration preferred. G. E. C.

THE operation of a Bell subscriber's circuit and method of connection is as follows: Referring to Fig. 600*a*, when the receiver is on the hook, no current will flow through the circuit as it is open at the hook contacts and the position of the condenser in series with the bell prevents any but alternating currents traversing that path. Removing the receiver from the

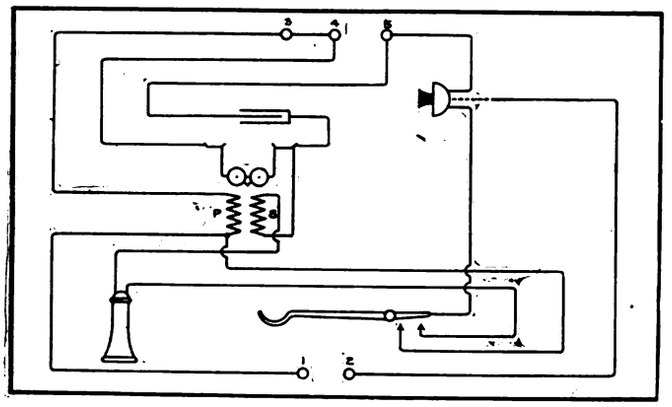

Fig. 600*a*.

hook closes a circuit through the transmitter, primary of induction coil and line. Current will then flow from the positive side of the battery, Fig. 600*b*, through the line relay No. 30, out over the line and back to the negative side of the battery. In this way the line relay is energized and it draws up its armature, closing the lamp circuit. The lamp being lit, notifies the operator that a party is calling, and she plugs into the answering jack with a back or answering cord of a pair, Fig. 600*c*. A circuit will then be completed from battery through the 12-volt supervisory lamp, 83.5 ohm winding of No. 19*c* resistance coil, sleeve of plug, sleeve of jack and cut-off relay to ground. The current flowing will energize the cut-off relay, causing it to open the contacts 1*x* and 1*y*, thus cutting off the supply of current for the line from that source.

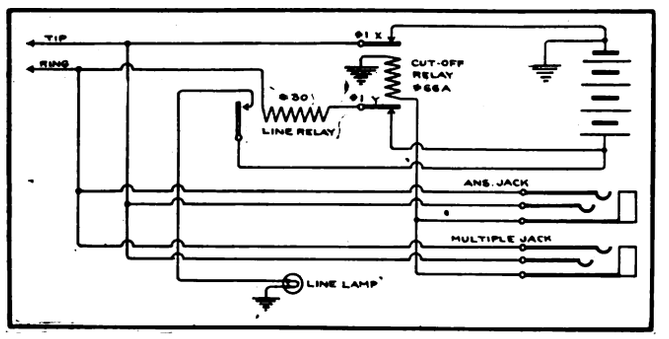

Fig. 600*b*.

However, the tip and ring conductors of the plug are in series with two windings *a a*, repeating coil and battery, as shown in Fig. 600*c*, and current is supplied to the line from this source. In series with the ring side of the cord is a supervisory relay, called a 25a. When energized it closes its armature circuit, which places the 40-ohm winding of the 19*c* coil in parallel with the supervisory lamp. Since the resistance of the coil is so much lower than that of the lamp it shunts a large portion of the available supply of current and consequently the lamp is extinguished.

The construction of the 25*a* relay is worthy of notice. It has two windings; one, copper, of approximately 12.5 ohms, the other german silver of about 100 ohms. Since the copper winding is inductive, the resistance it offers to the rapidly varying voice currents is very high. Consequently the quality of transmission would be affected if it were the only path. The german silver winding overcomes the difficulty because of its non-inductive character, and it therefore offers a by-path for the alternating currents without affecting the operation of the copper winding in its work of energizing the magnet core to attract the armature and also to supply sufficient current for talking purposes.

CIRCUIT CONNECTIONS OF VOLT AND AMMETERS.—(601.)

Can you tell me how the volt and ampere meters are wired up so that the electrical conditions of each cell may be measured as well as the whole battery? M. B. C.

Fig. 601 shows a diagram of voltmeter and ammeter connections to a battery, the connections to the former being arranged to read the voltage of each cell and the whole battery. A voltmeter switch is necessary to make the various connections to the

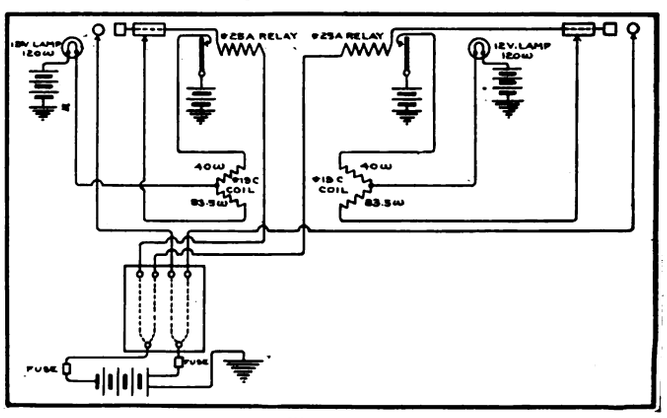

Fig. 600*c*.

voltmeter readily. Only one connection to each cell is necessary as the switch can be cross connected so as to give a circuit to the voltmeter when the switch blades *B* and *C* are slid over the bus bars *D* and *E* and contact blocks *F* and *G*. At the first position the voltage of cell No. 1 can be read and at each successive posi-

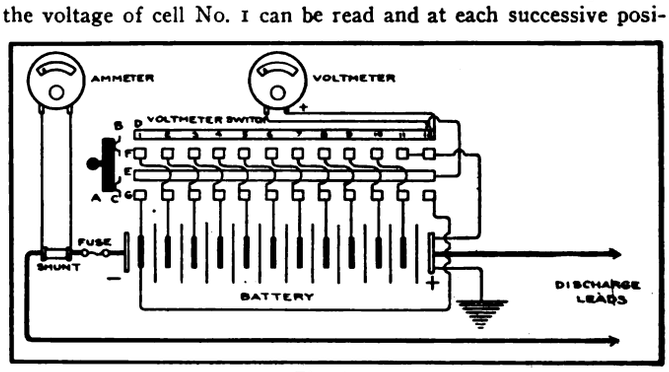

Fig. 601.

tion the voltage of each of the remaining cells read. The last position connects the two extreme poles of the battery to the voltmeter and will thus give voltage of the whole battery.

As the cells are in series it is only necessary to provide one ammeter connection, that of the discharge circuit, in order to find the current flowing.

The switch shown in the diagram is usually made in the circular form, the brushes *B* and *C* being mounted on a radial arm.

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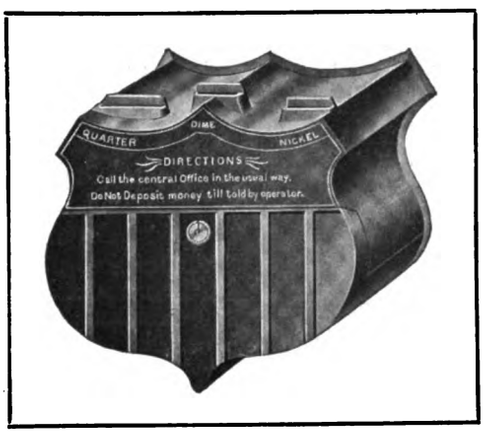

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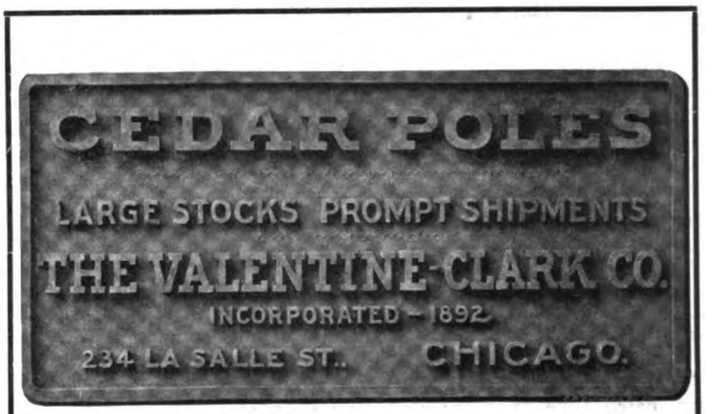

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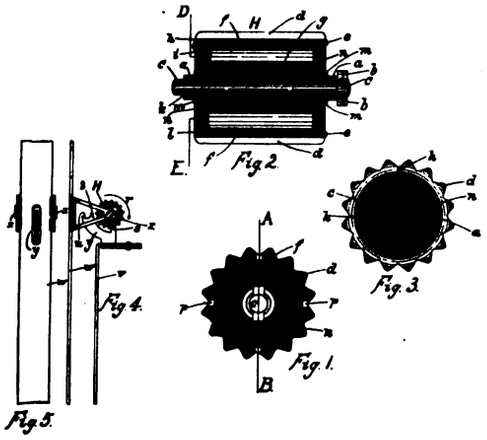
TELEPHONE PATENTS

SELF-SOLDERING HEAT COIL.

Frank B. Cook, of Chicago, Ill., patents (No. 792,315, dated June 13, 1905; filed April 13, 1905; serial No. 255,444) a self-soldering heat coil.

This invention relates to thermal protectors of the self-soldering type. Thermal protectors used for the protection of electric circuits and apparatus from unusually heavy currents are claimed by the inventor to be capable of further simplification and cheaper manufacture.

A metal tube *a*, through which a metal pin *c* is soldered, composed of an easily fusible solder, are the chief elements. A heat



producing winding *g* is wound upon the tube *a* between the insulating washers *nn*. In Fig. 3 the washers *n* are visible; in Fig. 1 the points *p p*, etc., are shown, turned over as parts of the shell *f*.

When an abnormally large current traverses the winding *g*, Fig. 2, for some time it heats the tube *a*, softens the solder *k*, thus allowing the spring *v* of Fig. 4 to turn the heat coil upon the pin *c* and release itself from the tooth *d*. When the heat susceptible material *k* cools and hardens, it resolders the tube *a* to pin *c* and the device is ready to be reset for another operation.

ANNUNCIATOR.

Leonard F. Rose, of Washington, Iowa, patents (No. 793,541; dated June 27, 1905; filed May 3, 1904; serial No. 206,173) an electrical annunciator.

The invention relates to an annunciator sensitive to a call sent in or telephoned; the current thus received operating by means of an armature and electro magnet to engage with a lug upon said armature and thus trip the shutter.

EXTENSION CIRCUIT CLOSER.

Jacob Robert Hershey, of Keokuk, Iowa, patents (No. 796,512; dated Aug. 8, 1905; filed Dec. 7, 1901; serial No. 85,418, and assigned by mesne assignments to Electrical Devices Company, of Keokuk, Iowa) an extension circuit closer.

In this invention, a readily applicable device for subscribers instruments is presented, sensitive in operation to weak currents in a call bell and actuated by the lever of said call bell.

SELECTIVE CALL DEVICES.

John A. Hulit, of Topeka, Kansas, patents (No. 795,836; dated Aug. 1, 1905; filed Sept. 3, 1904; serial No. 233,237) selective call apparatus.

By means of this invention, any one or group of stations may be called, or signalled, without calling or signaling the other stations on the same circuit. The invention involves the use of selective call apparatus, as described in the specifications, whose action is determined by means of relays and a special ratchet system for developing selectiveness.

MOUTHPIECE ATTACHMENT.

Orrin H. Savage, of New York, N. Y., patents (No. 796,607; dated Aug. 8, 1905; filed Sept. 1, 1903; serial No. 171,497) a device for sterilizing telephone mouthpieces.

It consists of an attachment to go over the mouthpiece having an absorbent pad or diaphragm, which can be removed and replenished.

SWITCHBOARD.

Martin C. Bust, of Chicago, Ill., patents (No. 794,343; dated July 11, 1905; filed Jan. 26, 1904; serial No. 190,711; and assigns by mesne assignment to F. A. Meidinger, of Chicago, Ill.) a telephone switchboard.

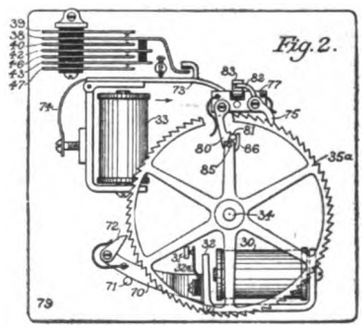
In this invention special means are provided for keeping the wires free from dust, by means of a well ventilated tubular wire distributor open at both ends.

TELEPHONE SYSTEM.

Edmund Land, of Grand Rapids, Mich., patents (No. 797,586; dated Aug. 22, 1905; filed Nov. 2, 1904; serial No. 231,052), a telephone system.

In this invention, an improvement is made in the operation of trunk lines between offices in a telephone exchange, or between parts of the same office in a telephone exchange. Rapidity of operation, economy in trunk line investment, and the saving of operator's time is claimed.

It is advantageous, to keep trunks between two offices, in as large a group as is warranted by the traffic and not to subdivide into smaller sub-groups. By means of a rotary switch, it is claimed, this advantage is secured. Shaft 34 in sketch carries three sets of contact wipers. The current received by relay 30, in shunt with a lamp, is sufficient to rotate shaft 34 one step by



the stroke of the armature 32. Contact between it and 31 is thus broken. A series of wipers connected to the shaft will cause rotation as long as any of the number are grounded. The relay 33 is not energized, as long as 31 and 32 are in contact, as this causes it to be short circuited. If 33 is operated, due to the lack of effective contact through rotation of shaft 34; the shaft ceases to rotate, armature 38 breaks contact with its point 39 and makes contact with 40. By this means, 42 and 43 are connected through contacts 46 and 47 to certain aforesaid wipers and ultimately by contact to limbs *C* and *D* of the trunk line. These lead to the distant office and become virtually two plug conductors. The claims cover a trunk line spring jack, a signal lamp, an automatic trunk selector adapted to connect a spring jack and a non-busy one to trunk lines, and means of lighting lamp during the process.

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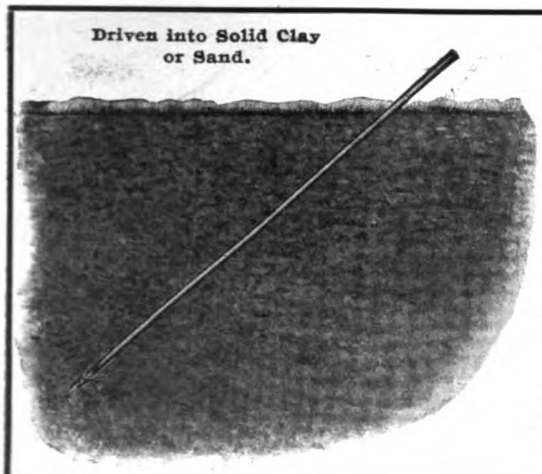

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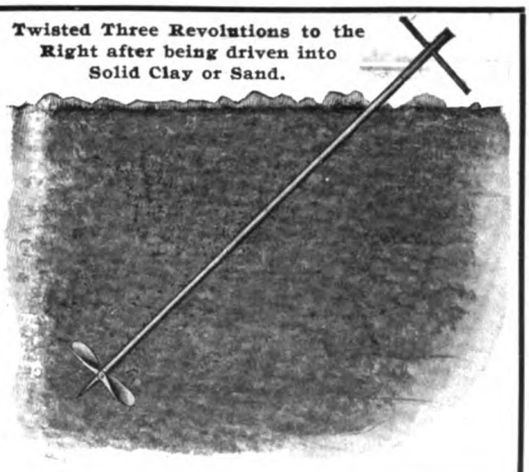

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WANTED—As traveling inspectors, 4 men of good appearance and address who have had general telephone experience. Application must be made in your own handwriting, giving history of your past experience and ample references. State salary expected. Address Geo. J. Yundt, Engineer, Southern Bell Telephone and Telegraph Company, Atlanta, Ga. 467

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IN THE MANUFACTURING FIELD

"SUCCESS LIES IN THE KNOWLEDGE OF OUR TOOLS"

A NEW TYPE GUY ANCHOR.

A NEW anchor for guying telephone or electric light poles has recently been put on the market and is attracting a great deal of attention. The name, The D. & T. Anchor, was taken from a description of its operation, the D and T being the first letters of the words drive and twist. This anchor, which is illustrated in Figs. 1 and 2, is driven into the ground with a sledge or maul to a depth of about five feet. The shaft is then twisted to the right three revolutions, by threading the bar through the eye, the revolution of the shaft spreads the blades to an angle of ninety degrees with the shaft itself. This spreading of the blades is caused by the peculiar shape which is something like that of the blade of a screw propeller.

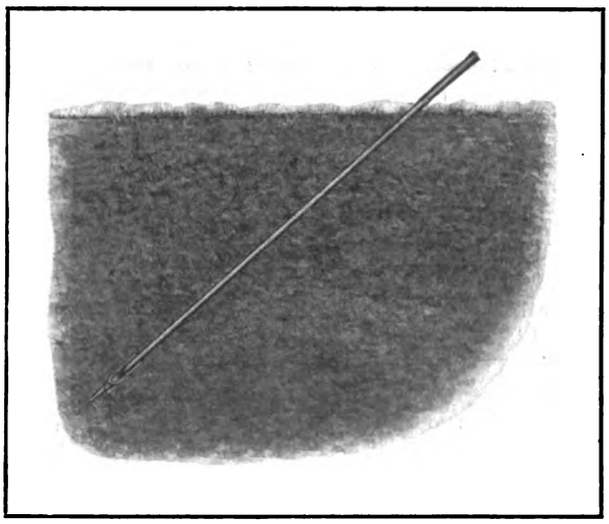

Fig. 1. Position of anchor when being driven into ground.

Fig. 1 is taken from a photograph of the anchor when being driven into the ground. Fig. 2 shows the anchor after it is driven into the ground and the shaft has been twisted three revolutions. These interesting photographs were obtained by driving the anchor into the ground and then digging the dirt away from the plane of the anchor to a distance of about six feet on either side. They well illustrate the unique idea of the anchor. Fig. 1 shows that the ground is not disturbed in the least by driving the anchor into the soil. Fig. 2 shows the enormous holding power which the anchor will have in undisturbed ground.

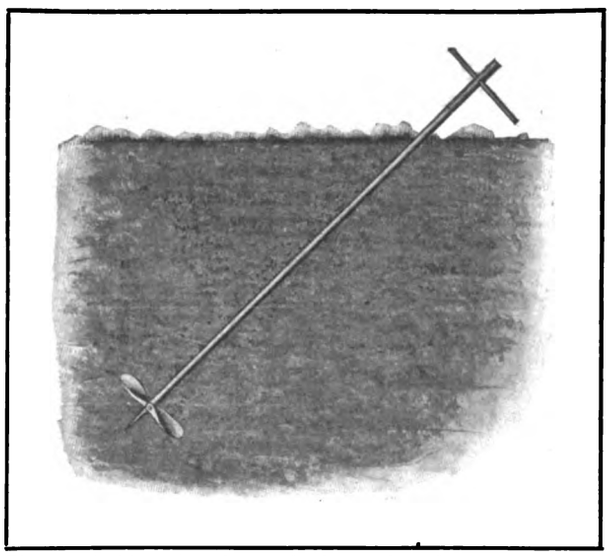

Fig. 2. Position of anchor ready for guying after three complete turns have been made.

The anchor is made up in four sizes for light work, ordinary, heavy and dead ending cables. The No. 1 is made with a 5 foot 5/8 inch steel shaft formed into a ring at the top, carrying at the bottom the wings, which spread 8 inches and are 2½ inches wide. They are supported on the shaft by a 5/16-inch pin made from tool steel. No. 2 is made with a 7/8-inch solid steel shaft 6 feet long, formed into a ring at the top, carrying at the bottom the two wings which spread 11 inches by 2½ inches wide. These are supported by a 5/16-inch tool steel pin. No. 3, which is recommended for toll line work, is made with a 6 foot 7/8 inch steel shaft, with the bull ring at the top, carrying wings which spread 12 inches by 3½ inches wide. The pin supporting the wings is ½-inch tool steel. No. 4 is the same construction as No. 3, except that the wings spread 18 inches. In order to save the stock around the pin, they have made a hole for the pin by spreading the rod in place of drilling the hole. In this manner the entire strength of the heavy shaft is saved.

The company claims that on account of the unique manner in which the blades are spread at a depth in the ground that this type of anchor has a holding power much greater than that of any other on the market; also that it can be installed in sixty seconds. It reports that one construction foreman who has used the No. 2 anchor states that he has installed them in ordinary solid sand in twenty seconds. This ease of installation makes the cost of placing the anchor in the ground remarkably low.

The D. & T. Anchor Company, of La Crosse, Wis., who are manufacturers of these anchors, will be pleased to send circulars showing their merits and also a souvenir model upon application.

THE INTERNATIONAL TELEPHONE MANUFACTURING COMPANY, Chicago, Ill., has recently secured a contract from the Macon County Telephone Company, of Decatur, Ill., for a full multiple lamp signal switchboard for magneto service. The board is to be so arranged as to admit of changing to full central energy at any time in the future. The present outside construction of the Macon system will be changed to full metallic when it is proposed to install central energy telephones.

A. S. MERRILL WILL HANDLE APPLETON ELECTRIC COMPANY'S LINE IN THE EASTERN STATES.

A. S. MERRILL, who has for a number of years been associated with the New York office of the Chicago Fuse Wire and Manufacturing Company, has severed his connection with that concern. Mr. Merrill has established an office at 227 Fulton street, New York City, and has made arrangements with the APPLETON ELECTRIC COMPANY, of Chicago, Ill., to take charge of its entire business in the eastern part of the country. With Mr. Merrill will be associated his brother, Frank H. Merrill.

The Appleton Electric Company is well known as a manufacturer of telephone and electrical supplies. Among its specialties are telephone fuse blocks and fuses, guy clamps, cable hangers, copper test connectors, distributing boards, tubular line fuses, glass fuses, tested fuses, wire and strip fuse links, lock nuts, bushings, etc. Mr. Merrill will carry a large and complete stock in his New York office and is preparing to make prompt and correct deliveries. The entire line turned out by the Appleton Electric Company is fully guaranteed, and prices are as low as is consistent with quality.

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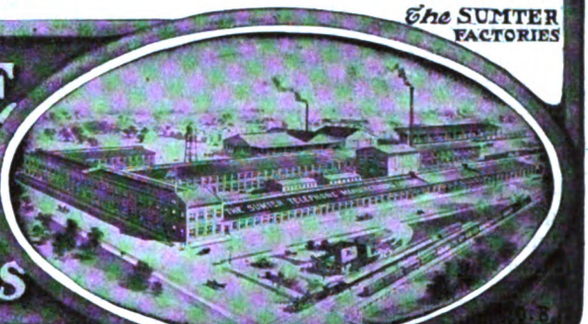

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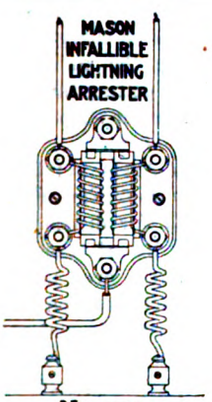

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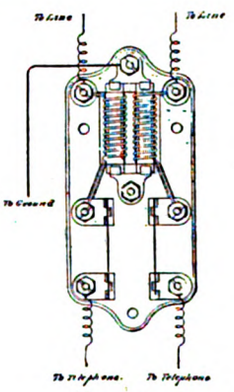

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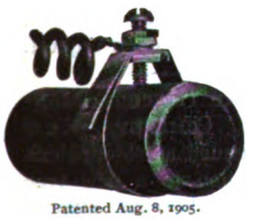

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IN THE MANUFACTURING FIELD

Mr. Merrill has a very wide acquaintance among telephone and electrical buyers in the Eastern States, and is very well liked on account of his social qualities. Mr. Merrill says that although his new connection has just become known, he has already received quite a number of good sized orders, and that the outlook for a successful season is very good. He will mail prices and complete catalogue of the goods carried to any one in the market.

THE DEAN ELECTRIC COMPANY, Elyria, Ohio, has secured a contract from the Medina Home Telephone Company, of Medina, Ohio, for a complete modern central office equipment. The switchboard is to be the common battery, lamp signal, multiple type, arranged for 1,200 lines. The present equipment will consist of two three-position sections. The new Dean 4-party selective equipment is to be furnished, individual indicating ringing keys being provided in each cord circuit for this purpose. Ringing current for the 4-party line and the regular line signalling is to be derived from a duplicate set of the new Dean battery pole changers. The Dean Electric Company has also secured a contract to re-equip three of the Kinloch Company's exchanges in St. Louis with its selective party line apparatus. In all there are about eighty operators' positions to be rebuilt. Besides the selective ringing system, a complete new order wire system is to be installed.

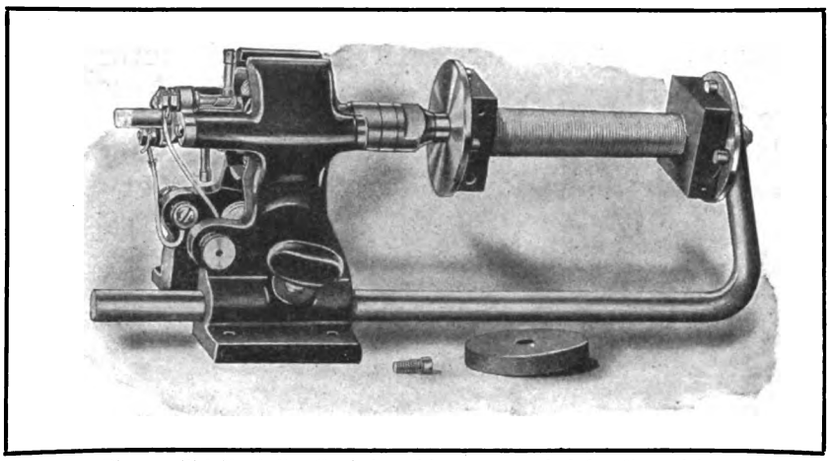

Fig. 1. Fisk-Newhall coil winder with motor attached for direct drive.

THE EWING-MERKLE COMPANY, of St. Louis, Mo., has issued the fifth number of the *Everbest Magazine*. This publication deals with electrical problems in a humorous vein, and contains, besides, some good common sense in the way of suggestions. The different classes of apparatus handled by the firm are described in the advertising section.

THE NATIONAL BATTERY COMPANY, Buffalo, N. Y., has issued Bulletin No. 2. This deals with storage batteries for voltage regulation. Illustrations showing its apparatus in use are included, together with a detailed description of the scheme employed. A voltmeter chart showing the difference before and after the battery had been applied to a line for regulating purposes is given on the last page. This bulletin, together with full information respecting National storage cells will be mailed upon request.

NEW WINDING MACHINES.

SOME means to rewind coils has been much needed in the past. It frequently happens that coils burn out or become short-circuited which are absolutely necessary for the operation of a plant. The delay caused by sending them to the factory costs much more than their rewinding through lost business and general inconvenience. To offset these troubles the Fisk-Newhall Telephone Manufacturing Company, 241-249 South Jefferson street, Chicago, has recently placed upon the market two winding machines, which are illustrated in Figs. 1 and 2. The winder shown in Fig. 1 is fitted with a motor which can be operated by a battery of dry cells placed in series. This machine will take in all sizes of coils from the smallest drop to the largest induction coil. It is fitted with a little emery wheel for sharpening drills or any other use which may be required of it. The Fi-Ne armature winder is shown in Fig. 2. This device will take any sized armature. It is provided with a clamping device so that it can be attached to a bench for winding purposes and then removed after the operation is completed. The manufacturers claim these devices will save their cost in express charges, besides eliminating the annoyance due to delays in getting the coils back from the repair shops.

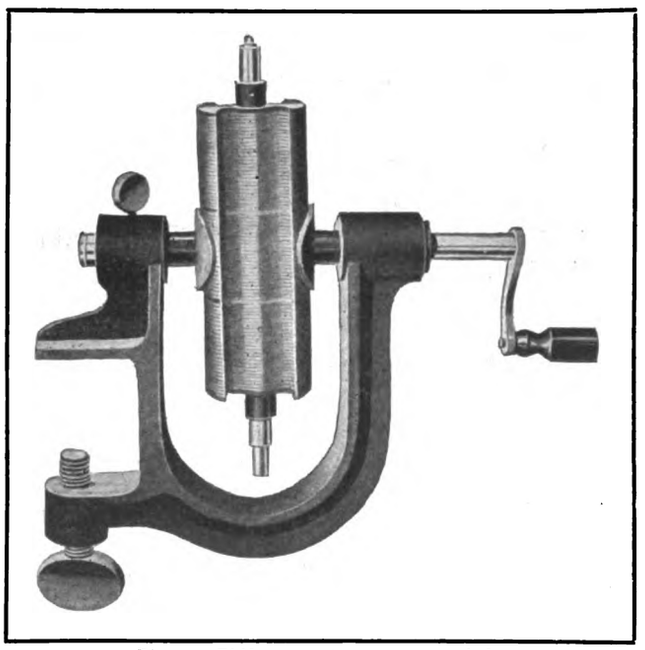

Fig. 2. Fi-Ne generator armature winder.

THE ELECTRIC APPLIANCE COMPANY, Chicago and San Francisco, has ready for distribution a revised price list of telephone insulators. Prices are quoted for standard packages and also upon smaller quantities and carload lots. The insulators priced are Nos. 9, 11, 12, Pony; Nos. 1 and 2 transposition and two piece transposition. Besides this list the company has others covering line and construction material, which it will mail upon request.

THE DEVEAU TELEPHONE MANUFACTURING COMPANY, New York, has issued a folder which draws attention to a new type automatic ball-bearing interior telephone it is just bringing out. Its new catalogue, No. 12, will be mailed to parties interested. The company states that prices have been reduced and that interior instruments for ten stations can now be obtained for the same price formerly charged for six point instruments.

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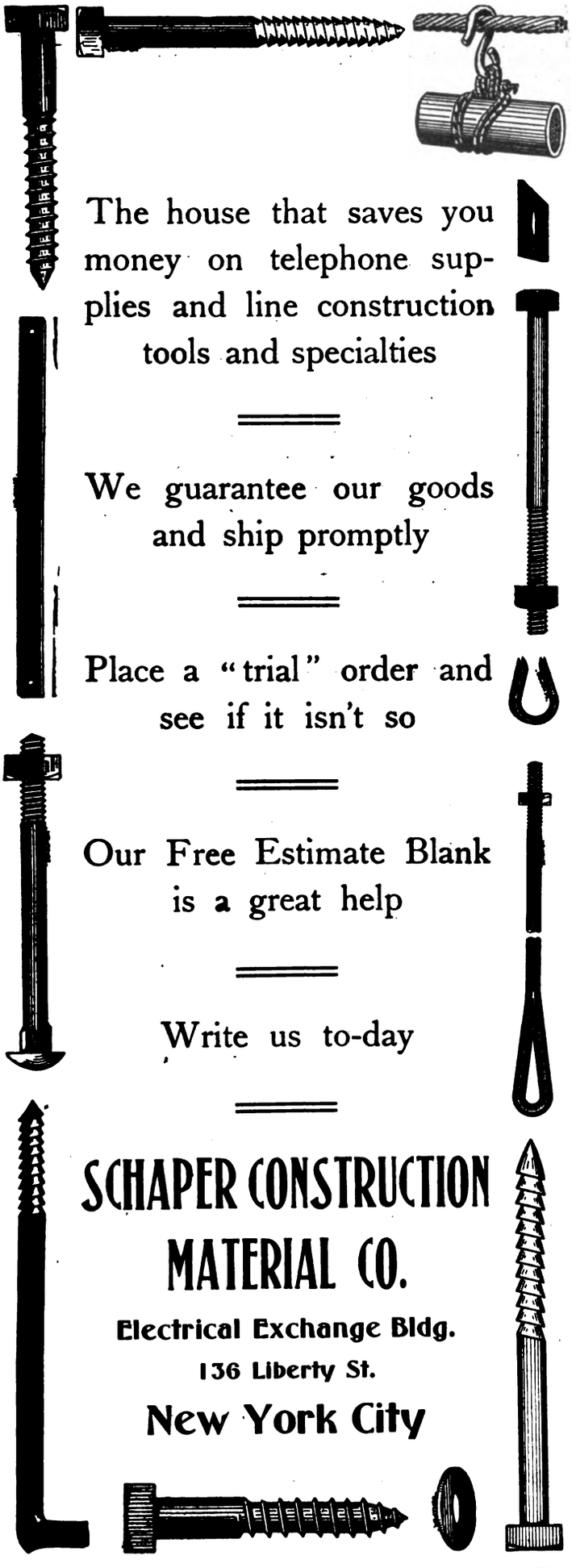


The house that saves you money on telephone supplies and line construction tools and specialties

We guarantee our goods and ship promptly

Place a "trial" order and see if it isn't so

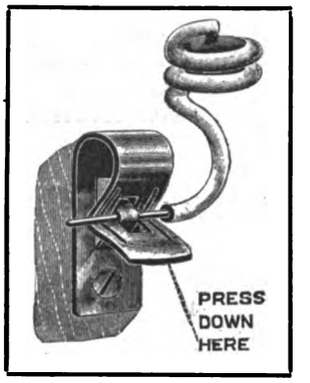
Our Free Estimate Blank is a great help

Write us to-day

SCHAPER CONSTRUCTION MATERIAL CO.

Electrical Exchange Bldg.
136 Liberty St.
New York City

REMEMBER



Batteries cost no more when equipped with the Fahnestock Spring Binding Post than with the old style Screw Post.

Let us send you a sample. It's free.

Fahnestock Transmitter Co.

132 HAVEMEYER STREET, BROOKLYN, N. Y.

LOOK IN THE CATALOGUE

of your supply dealer and you will find the "Bull Tongue" Anchor listed; if not, let me sell you direct.

I make the best and cheapest Anchor. It does the work, costs little and is quickly installed. Full information free.

I. A. BENNETT,
141 South Clinton Street, CHICAGO

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struction material for the Weedsport Telephone Company, of Weedsport, N. Y.; all construction material and telephones for the East Concord Telephone Company, East Concord, N. Y., and a number of P. B. X. switchboards for the Frontier Telephone Company, Buffalo, N. Y.; also a toll switchboard for the Princeton Telephone Company, Princeton, Ind. It also reports an increasing demand for its telephones equipped with platinum electrode transmitters. This transmitter has proven itself to be entirely satisfactory for all purposes.

A SELF-SOLDERING NOZZLE.

WHEN cables terminate at junction boxes the most approved practice calls for the use of a pot-head. This is a lead sleeve wiped on the sheathing of the cable, and within it the cable wires are spliced to some sort of rubber insulated wire, which lead up to the terminals. In small towns it is generally a difficult matter to get a man who is competent to wipe a joint of this description. Even a plumber is useless if the terminal is on top of a pole unless he is able to climb.

To offset this difficulty Frank B. Cook has recently brought out a self-soldering nozzle, which is herewith illustrated. In Fig. 2 the nozzle is shown before the cable is introduced. It consists of a turned brass funnel-shaped tube having a threaded flange on its widest end. The solder and flux is laid on the inner side of the tube. After the cable is in position a layer of tape or cloth is then wrapped around the lower end of the nozzle to prevent the solder running out, and then the application of heat from a blow torch upon the exterior will cause the solder to melt and flow downwards around the cable, thus making a thorough joint as shown in Fig. 3. The manufacturer claims that the funnel-shaped tube is preferable to a straight one because the melted solder will flow more readily and leave no air holes. In Fig. 1 the application of these nozzles to a junction box is shown. All Cook junction boxes or terminals are supplied with these nozzles.

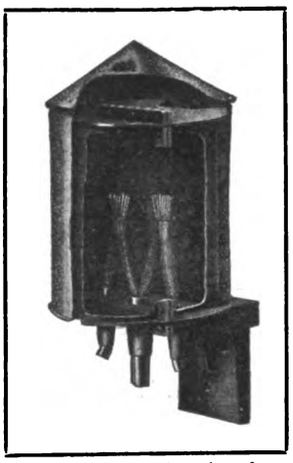

Fig. 1. Cook junction box with self-soldering nozzle.

THE CHASE-SHAWMUT COMPANY, of Newburyport, Mass., is placing on the market a ground clamp for grounding the secondary wires of alternating distribution systems. These clamps are made for use on ¾-inch to 3-inch pipe, and are so constructed as to give the maximum strength with a minimum amount of metal. Full particulars will be furnished upon application.

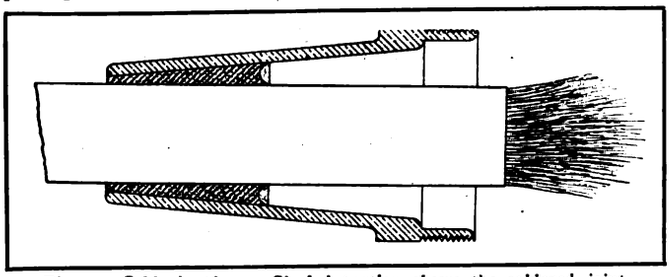

Fig. 3. Cable in place. Shaded portion shows the soldered joint.

THE STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY, Rochester, N. Y., reports having closed contracts for switchboards for the following places: Litchfield, Mich.; Georgetown, Tex.; Paola, Kan.; Simpsonville, Ky.; Finchville, Ky.; Waddy, Ky.; Bagdad; Toledo, Ohio; Branchport, N. Y.; Philadelphia, for use at Scranton, Pa.; Lewiston, Idaho; Alpena, Mich.; Bristol, Tenn.; Des Moines, Iowa; Rochester, N. Y.; Walhalla, S. C.; Apalachicola, Fla.; Bristol, Fla.; Herman, Neb.

THE MOUNTAIN STATE ELECTRICAL COMPANY, Wheeling, W. Va., manufactures a line of special hardware for cable construction intended for carrying messenger wires to anchor, without attaching them around poles, and a messenger clamp that has found great favor with construction engineers.

One of its most popular novelties is an iron "T" bracket, for taking off subscribers' drop wires. This bracket is bolted to the side of the pole, and is made in two styles for two or four pairs of drop wires, as desired.

It reports recent sales of its cable terminals to Hastings, Neb., and Boise, Idaho. The line of special fittings and terminals has been designed by Frank B. Hall.

The company will be pleased to furnish further particulars and prices upon request.

THE DEAN ELECTRIC COMPANY, Elyria, Ohio, has just received an order from the United States Signal Corps for five hundred field telephones. These instruments are of the portable type especially built for rough service and to stand extreme climatic conditions—heat, cold and moisture.

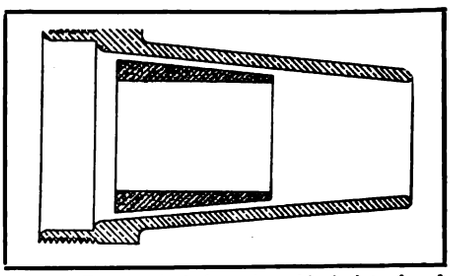

Fig. 2. The nozzle before the cable is introduced.

It has also been awarded a contract by the Kinloch Long Distance Telephone Company of St. Louis, Mo., for equipping its three St. Louis sub-exchanges with the new Dean party line system. In all there are eighty-three operators' positions to be equipped with this new apparatus. This equipment includes new plug shelves, iron frame key shelves, new 4-party line indicating ringing keys, new supervisory lamp jacks and caps and new order wire keys with associated visible busy signals. Duplicate sets of ringing machines for furnishing four frequency ringing currents, with busy back. Don't answer and howler attachments are also to be furnished for each exchange.

It will be remembered that the new Dean party line system rings four parties bridged across a metallic line circuit, selectively without any ground connections and without special telephone equipment excepting a new type of ringer. The simplicity and reliability of this new system has already been the means of its adoption in over twenty-three exchanges.

The Dean Electric Company, while only in the manufacturing field about one year, has made an enviable reputation by turning out carefully designed and thoroughly well built apparatus. In this short time its business has increased to such an extent as to require increased manufacturing facilities which has just been furnished by a large addition to its factory, giving over seventy-five per cent. greater capacity.

THE GENERAL STORAGE BATTERY COMPANY, 42 Broadway, New York City, has secured the services of J. B. Cowen (formerly prominently connected with the G. I. Company for many years past) for the management of its sales department.

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Kellogg Switchboard and Supply Co.

CHICAGO, ILL.

Wholesalers of **Michigan White Cedar** **POLES** *of* **QUALITY**

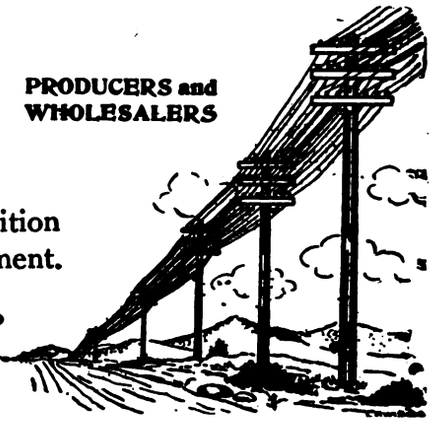
Five Yards ***Prompt Shipments***

PITTSBURG & LAKE SUPERIOR IRON CO.,
ESCANABA, MICHIGAN.

PRODUCERS and WHOLESALERS

WE always carry a large stock of all sizes of White Cedar Poles, and having yards on all principal railroads in Northern Michigan and Minnesota, are in position to make immediate shipment.

"From the Stump to the Line."



COMPARISON SHOWS THAT

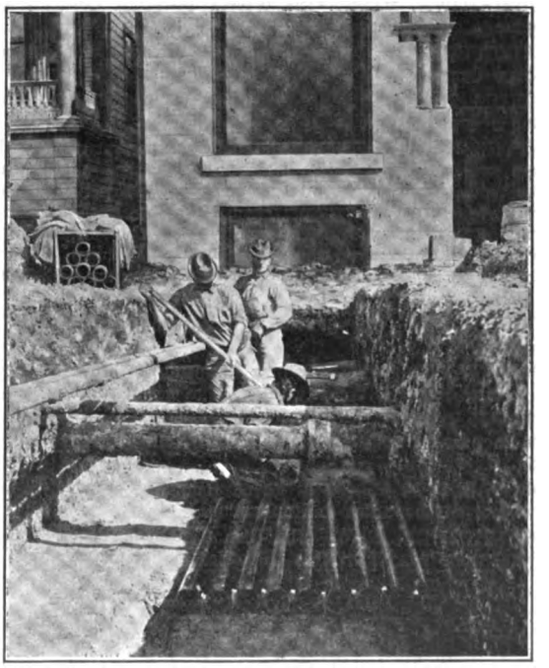
Some Poles are Good;
Others are better, but the
Sand Point Cedar Company's
Are the BEST.

Because our location enables us to
Cut only that timber which has the
Necessary qualifications of
Soundness, Strength and Straightness.

Hadn't you better write us for
Quotations upon Superlative
Quality Cedar Poles?
They cost no more than the other kind.

SAND POINT CEDAR CO.
SAND POINT, IDAHO

BITUMINIZED FIBRE CONDUIT
For Underground Construction



The American Conduit Company has a corps of experts in underground construction and is prepared to furnish supervision of work if desired. We would prefer to co-operate with contractors in underground construction, but if desired will submit estimates and bids and take contracts for completed underground systems in any part of the United States or Canada.

AMERICAN CONDUIT COMPANY,
Main Offices, 1005-6 Manhattan Building, Chicago
Other Offices, 170 Broadway, New York 336 Macy Street, Los Angeles

Please mention THE AMERICAN TELEPHONE JOURNAL when writing to ADVERTISERS.

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FINANCIAL.

DECATUR, ALA.—The Long Distance Telephone & Telegraph Company of Decatur has increased its capital from $500,000 to $1,000,000.

SYCAMORE, ILL.—The DeKalb County Telephone Company has increased its capital from $100,000 to $150,000.

SALINA, KAS.—The Salina Telephone Company has increased its capital stock from $50,000 to $150,000.

BOLIVAR, OHIO.—The Imperial Home Telephone Company has increased its capital from $10,000 to $40,000.

FRANCHISES.

SEATTLE, WASH.—Bonds aggregating $1,000,000 in value are now being floated in the East by the Independent Telephone Company, of this city, to provide for elaborate extensions to the local and outside service. It is the intention of the company to absorb a number of smaller companies in the field, if possible, and carry its lines as far as practicable to all the points in the State and Northwest. At present it is asking franchises to start competition in both Portland and Tacoma, a franchise has been granted for Everett, and one is being asked for as far north as Vancouver, B. C.

GADSDEN, ALA.—A franchise has been granted to W. R. Crumb and associates to erect a telephone system in Gadsden.

ANNA, ILL.—The Mt. Pleasant Telephone Company has been granted a franchise at Anna.

DIVERNON, ILL.—The Kinloch Telephone Company is asking for a franchise through Divernon. The company proposes to build a line from Auburn to Taylorville by way of Divernon and Pawnee.

HERSCHER, ILL.—The Independent Telephone Company of Kankakee has been granted a franchise at Herscher.

NEWTON, MISS.—The Newton Telephone Company has been granted a franchise to erect and operate a local and long distance telephone system.

WEATHERFORD, TEXAS.—W. B. Lusk has been given permission to erect a telephone line in Weatherford.

WAUPACA, WIS.—The Waupaca Independent Telephone Company has been granted a franchise.

ELECTIONS.

LITCHFIELD, ILL.—At the annual meeting of the People's Mutual Telephone Company, the following officers were elected for the coming year: A. G. Butler, George W. Rainey and August Kellenberger were elected directors for a term of three years. The two former were re-elected and the latter was elected to succeed W. B. Potts, whose term had expired.

DECATUR, IND.—The Citizens' Telephone Company has elected the following officers: Henry Hite, president; John S. Bowers, vice-president; F. M. Schirmeyer, secretary and manager, and E. X. Ehinger, treasurer. The following directors were elected: Frank M. Shirmeyer, Henry Hite, E. X. Ehinger, John S. Bowers and Dr. D. D. Clark.

BAINBRIDGE, N. Y.—The Bainbridge & Guilford Telephone Company has elected the following officers: President, Otto Ives; secretary, C. N. Smith; treasurer, Oscar Fletcher.

COMBINATIONS.

FARMINGTON, MO.—The Farmington Telephone Company was sold by T. P. Pigg to local capitalists for about $60,000. The system is one of the largest in Missouri, outside of the large cities having switchboards at Farmington, Flat River, Bonne Terre and Deer Run.

SUCUMCARI, NEW MEXICO.—Dr. B. F. Herring of Lake Arthur has purchased the local system and will install new apparatus.

LYSANDER, N. Y.—The Patrons Telephone Company has secured the line of Dr. Sinclair, extending from Lysander through Jacksonville, Little Utica and Lamsons, terminating at Baldwinsville. The company will at once commence reconstructing the line between Lysander and Lamsons.

LOWVILLE, N. Y.—The Black River Telephone Company, of Lowville, has purchased the Citizens Telephone Company of Black River.

BELLEVUE, OHIO.—Controlling interest in the local Telephone Company and the Bellevue Telephone Company has been sold to Frank A. Knapp. The local Telephone Company operates in Huron and Crawford counties and has 4,200 telephones in use and over 200 miles of toll lines. It is understood that associated with Mr. Knapp are some of the strongest Independent telephone interests in the State. The deal carries with it the control of telephone properties representing an investment of over $400,000.

NEW COMPANIES.

FOWLER, COLO.—The citizens of Fowler have decided to form a mutual telephone company. Among those active in the formation are S. P. Davis, R. G. Blakey and J. F. Hall.

CLASFORD, ILL.—The North Star Telephone Company has been incorporated with a capital stock of $2,200. Incorporators: Andrew Northrup, M. R. Turpin and C. W. Rusch.

GOERING, KY.—The Goering Telephone Company has been incorporated with a capital stock of $600.

STUBBLEFIELD, KY.—The Citizens Telephone Company has been incorporated with a capital stock of $500. Incorporators: H. A. Walston, H. I. Batts, D. A. Brown, G. M. Daniel and others.

S. WINDHAM, ME.—The Windham Telephone & Telegraph Company, with a capital stock of $10,000, has been incorporated. J. Hacker Hall, president; H. C. Hawkes, secretary and treasurer.

CHAMBERLAIN, MINN.—The Great Western Telephone Company has been incorporated with a capital stock of $25,000. The incorporators are: Warren Young, David Henry and F. B. Rowe. The company will construct a line from Presho along the proposed line of the Milwaukee Railroad.

WILLOW, OKLA.—The Willow Telephone Company has been incorporated with a capital stock of $1,000. J. G. Cousins, president; Dr. M. M. Dearman, of Mangum, secretary.

MURRAYSVILLE, PA.—The Murraysville Telephone Company has been incorporated with a capital stock of $5,000. It will build a line from Wilkinsburg to Murraysville. Directors: G. M. Greer, Chas. Stunkard, Murraysville; J. C. Greer, Claridge.

LEANDER, TEXAS.—The Block House & Leander Telephone Company has been organized. A. Bittick, president; L. F. Chapman, secretary.

RHEA SPRINGS, TENN.—The Rhea Springs Telephone Company has been incorporated with a capital stock of $1,000. Incorporators: A. C. Ewing, J. M. Ewing, S. S. Brady, J. E. Garrison and others.

RIPLEY, TENN.—A stock company has been formed at Ripley with a capital stock of $1,500 to put in a line from Halls to Edith, by way of Nabkipoo. Incorporators: J. H. Bibb, G. N. Grear, L. F. Adams, E. Abernathy and A. B. White.

HARTWOOD, VA.—The Hartwood & Fredericksburg Telephone Company has been incorporated with a capital stock of $4,000. D. J. Shopoff, president, Storch's; C. J. Henry, vice-president, Hemp; P. W. Irvon, secretary and treasurer, Falmount.

CHIPPEWA FALLS, WIS.—The Yellow River Telephone Company has been organized with a capital of $10,000. D. McElmurry of Colburn is secretary.

DARLINGTON, WIS.—The Lafayette Telephone Company has been incorporated by H. W. Burmeister, Dr. S. Birkbeck and Ed. Brannan, the capital stock being $25,000. The above company has bought the interests of the Lafayette County Telephone Company, except a part of the exchange at South Wayne, and will do business in this and adjoining counties.

MISCELLANEOUS.

FOWLER, COLO.—A meeting of representative citizens was held here recently for the purpose of organizing a mutual telephone company. A committee was selected for the constitution and by-laws, another on solicitation for telephones, and a third for estimating the cost of material. The meeting adjourned to meet in two weeks, when the reports of the committees will be heard.

FLORA, IND.—The Bringhurst Telephone Company has been admitted as a member to the Carroll County Co-operative Association. At a meeting of the Carroll County Co-operative Association Dr. U. E. Tesh, president of the Camden Company, was elected secretary and treasurer.

LOGAN, IOWA.—At a recent meeting in this city plans were discussed for the formation of a Farmers Mutual Telephone Company.

UDALL, KAS.—The Home Telephone Company has moved into a new office. The new quarters are more commodious and afford better facilities for handling its rapidly increasing business.

PONTIAC, MICH.—The Oakland County Telephone Company has issued a statement denying any intention of selling out to the Michigan State Telephone Company. It says that, on the contrary, it is about to improve its service with Detroit.

MORRISTOWN, MINN.—The Morristown Telephone Company has entered into a five year contract with the Price County Rural Telephone Company for interconnection and toll service.

PRINCETON, MINN.—The Tri-State Telephone Company has established new stations at the following places: Eagle Lake, Moorhead, Moose Island, Minn., and Taft, N. D.

WAPAKONETA, OHIO.—At a meeting here of the bondholders' committee of the Commercial Telephone Company of Texas, steps were taken to reorganize the company. The committee represents nearly $300,000 worth of bonds, owned in Ohio, Indiana and Kentucky, and has won out in all litigation and last month in Travis County, Texas, bought in all the prop-

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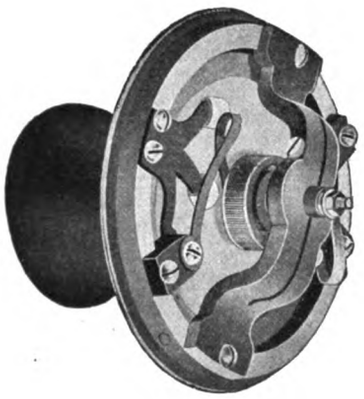
CENTURY
100 % GOOD



Actual experience has proven that the

PLATINUM ELECTRODE

is the only reliable and efficient transmitter.

This transmitter will give you perfect service and will outlast any other.

It will give exactly the same service after ten years' use as when first installed.

It is entirely free from all troubles found in carbon electrode transmitters.

It never needs any attention; consequently will reduce your maintenance considerably.

It transmits the voice perfectly with all its original qualities. It is not harsh, nor has it any metallic tones. It will never pack.

You can prove the above by a thorough test, which can be made without any expense to yourself. We will send you a sample prepaid. In sending for sample advise whether for common or local battery.

CENTURY TELEPHONE CONSTRUCTION CO.
332 ELLICOTT STREET
BUFFALO, N.Y.

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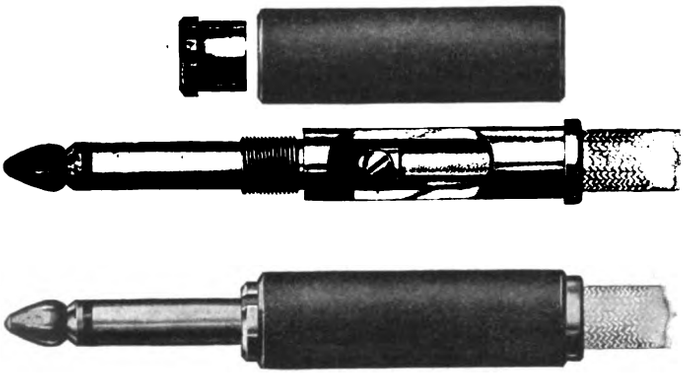
MONARCH SWITCHBOARDS

THE PLUG

Durability is the first consideration. All exposed metal parts are made of Tobin bronze, the hardest, toughest of metals.

The tip is thoroughly insulated from the sleeve with hard rubber bushings, both within the shell and at the end.

The tip conductor of the cord is wrapped with fine wire so as to form an almost solid tip and is then inserted in a hole in the tip conductor of the plug and held by a set screw. Hard rubber insulation protects the tip within the shell so there is no chance for short circuits.



The sleeve conductor of the cord is turned back and the whole end of the cord screwed into the plug. A deep coarse thread holds the cord firmly in place and takes all strain from the conductors.

The fibre sleeve is loose. It is free to revolve between a brass ferrule in front and a rim at the rear of the plug. There is no small screw to work out and get lost.

The plug is large enough to be substantial and durable, but is not so large as to be unwieldy or cumbersome.

For a full description of this and all other parts of Monarch Switchboards see the complete catalogue. A copy will be sent upon request.

MONARCH TELEPHONE MANUFACTURING CO.

10-16 SOUTH CLINTON STREET **CHICAGO, U. S. A.**

$4.60 AUTOMATIC vs. $9.40 MANUAL

Our automatic telephone system has been adopted in the following cities:

Chicago, Ill.	Portland, Ore.
Grand Rapids, Mich.	Woodstock, N. B.
Columbus, Ohio.	St. Mary's, Ohio.
Dayton, Ohio.	Westerly, R. I.
Lincoln, Neb.	Manchester, Ia.
Portland, Me.	Princeton, N. J.
Auburn, N. Y.	Albuquerque, N. M.
Lewiston, Me.	Van Wert, Ohio.
Auburn, Me.	Battle Creek, Mich.
Fall River, Mass.	Clayton, Mo.
New Bedford, Mass.	Pentwater, Mich.
Los Angeles, Cal.	Toronto Junction, Can.
San Diego, Cal.	Wilmington, Del.
Hopkinsville, Ky.	Riverside, Cal.
Sioux City, Ia.	Traverse City, Mich.
Cleburne, Tex.	Hastings, Neb.
Columbus, Ga.	Wausau, Wis.
South Bend, Ind.	El Paso, Tex.
Aberdeen, S. D.	Havana, Cuba.
Miamisburg, Ohio.	Marianao, Cuba.
Medford, Wis.	Berlin, Germany.

Operation and Maintenance Expense per 'phone per annum of one of the Telephone Companies that replaced their Manual with our AUTOMATIC SYSTEM. (We will send name of company and detailed statement of above upon request.)

This saving of more than 50 per cent. in Operation and Maintenance cost is pretty strong evidence of the economy of Automatics.

Hand in hand with the decrease in operating expenses goes the increase in quality of service. This latter means more business. All these Automatic advantages combined mean higher values for securities, bigger dividends for the stockholders.

Don't you see that you're wasting money on that out-of-date Manual equipment of yours? If you're a new company, start with Automatic, and start right.

AUTOMATIC ELECTRIC COMPANY

Van Buren and Morgan Sts. **CHICAGO, ILL.**

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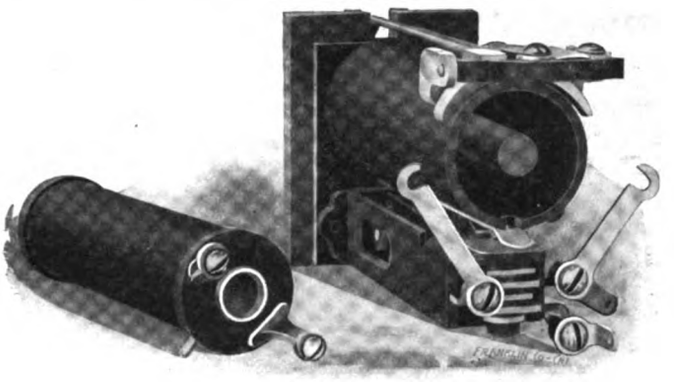
DEAN TELEPHONE APPARATUS

EXPRESS TYPE SWITCHBOARDS



DROP AND JACK.

Winding removed without disturbing magnetic circuit or drop adjustment.

We have succeeded in producing a magneto switchboard which combines all of the desirable features that have been shown by experience to be absolutely necessary for succesful working—a difficult problem when done right.

Our switchboard cabinets are especially well designed and carefully built. Much of the equipment is of the same design and construction as that used in our large multiple switchboards.

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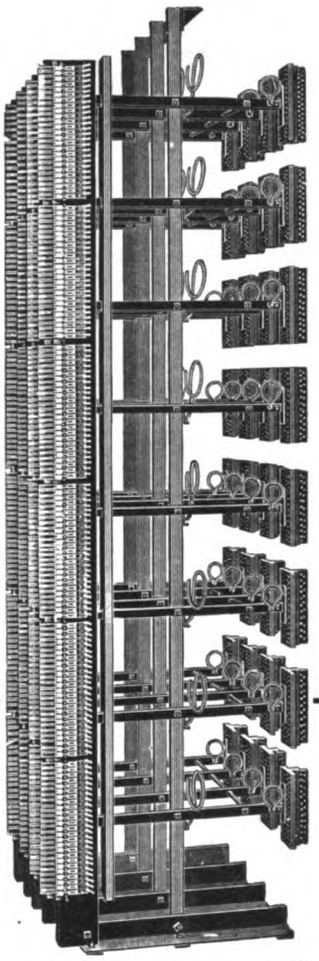

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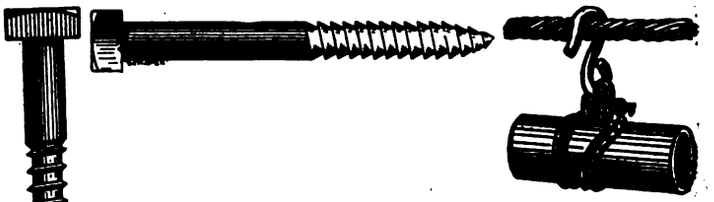

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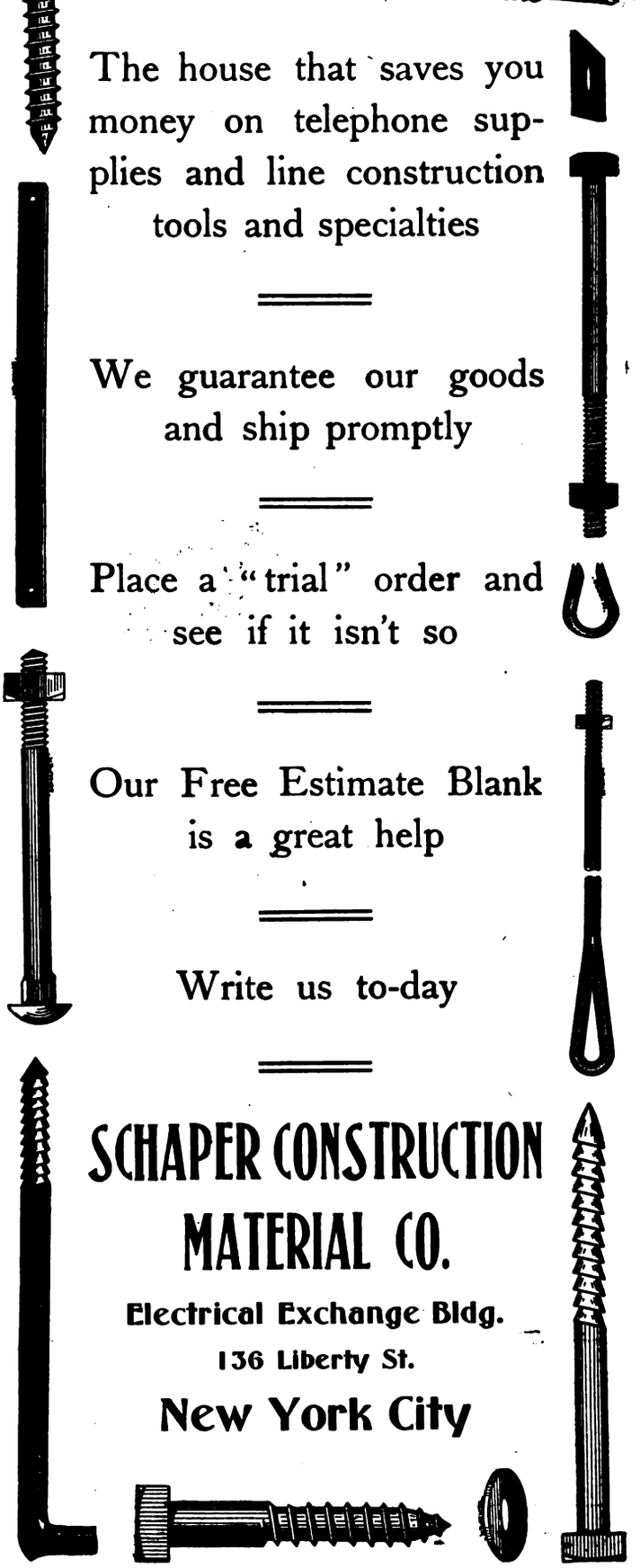

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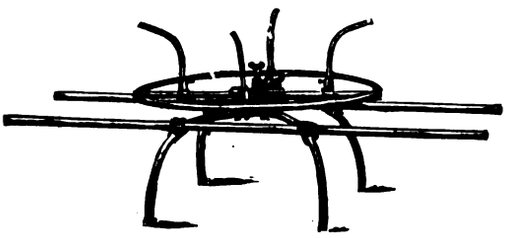

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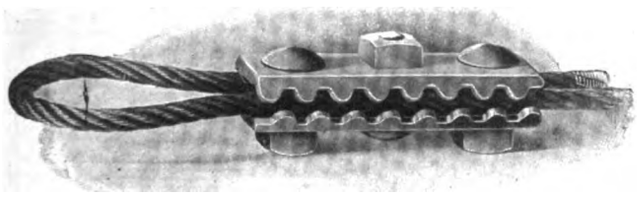

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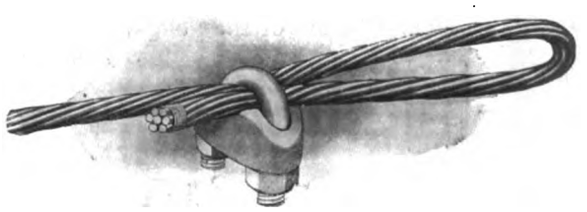

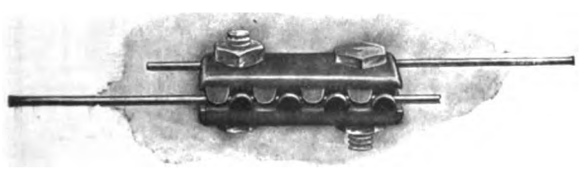

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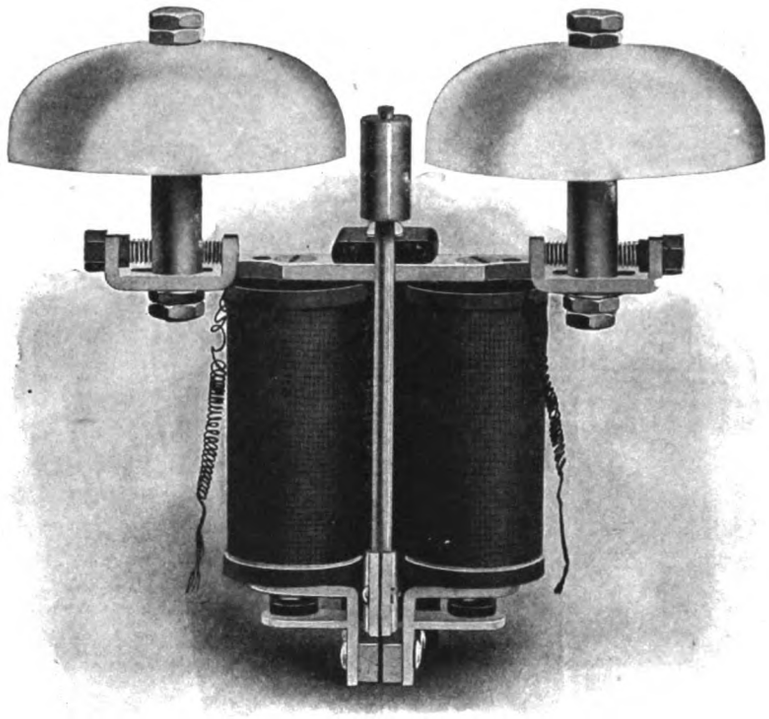

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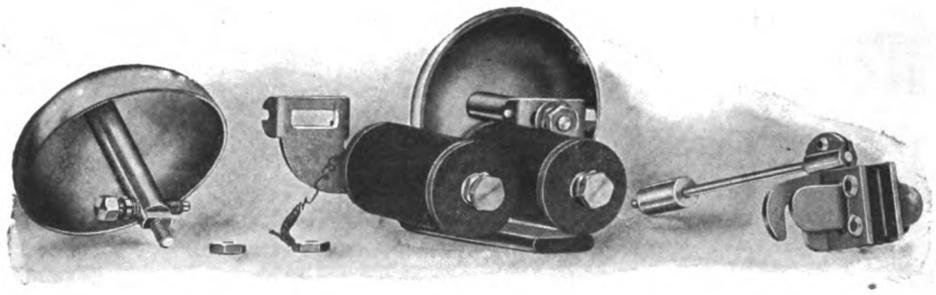

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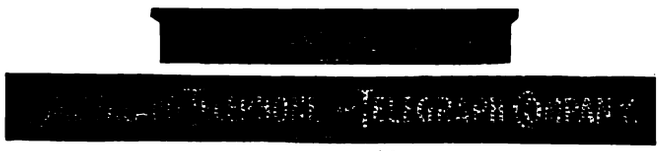

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The restoring device is unique, giving unusual play.

The dust proof feature is one not to be disregarded.

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We want to tell you each individual feature, every detail. You will find it to your advantage to investigate.

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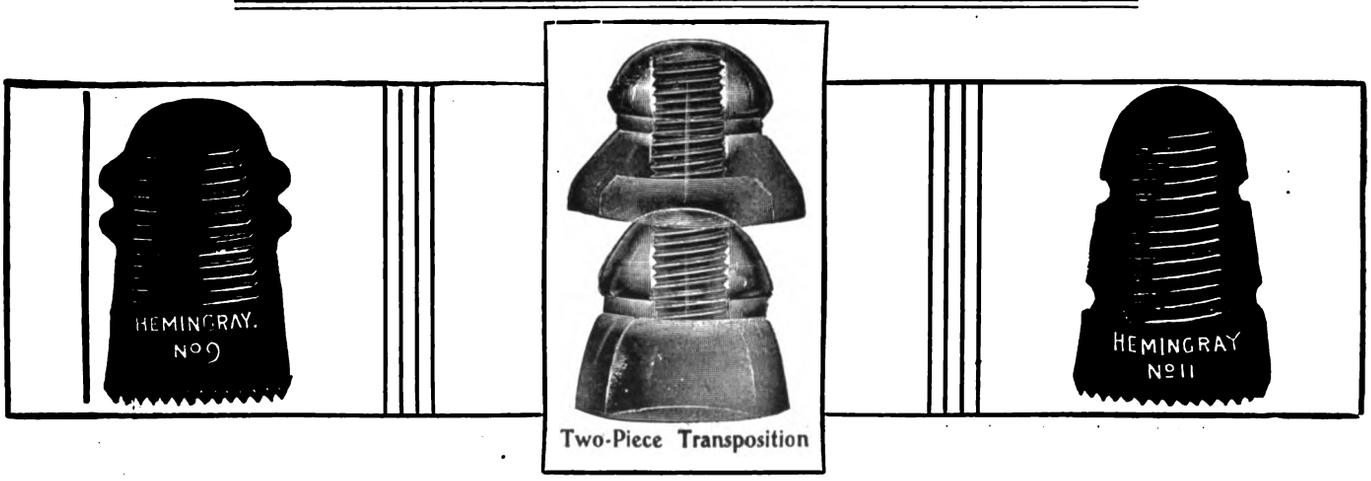

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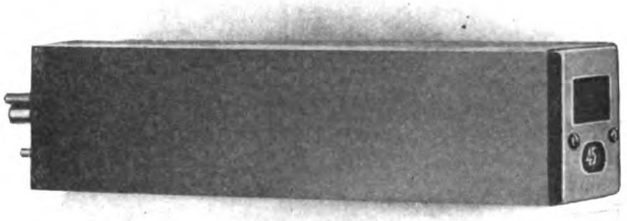

Fig. 1.

Each signal is self-contained, mounted individually and enclosed in a copper shell or case to prevent cross talk.

Fig. 1 shows a complete signal, and Fig. 2 signal with shell removed.

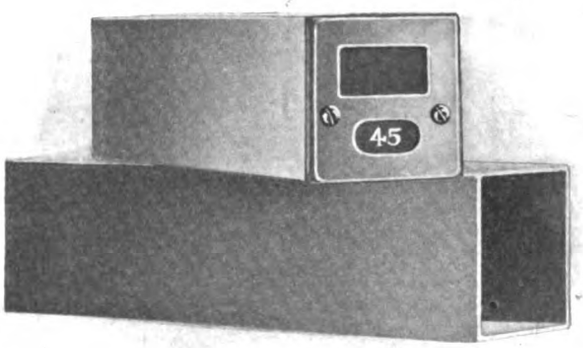

Fig. 2.

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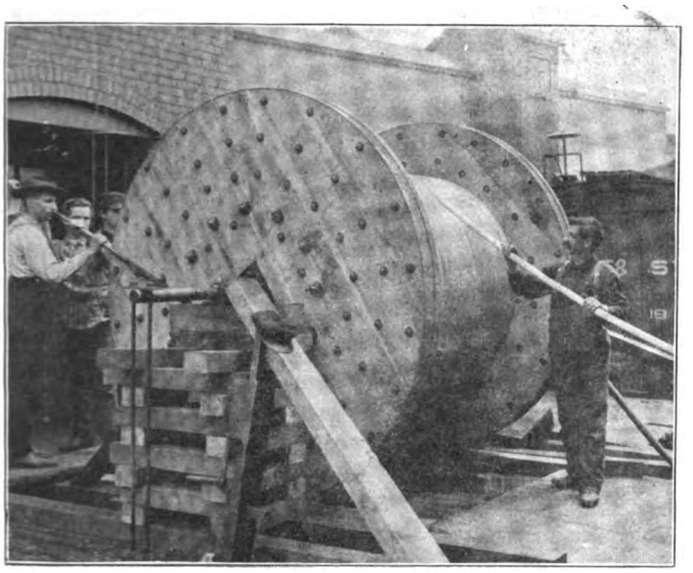

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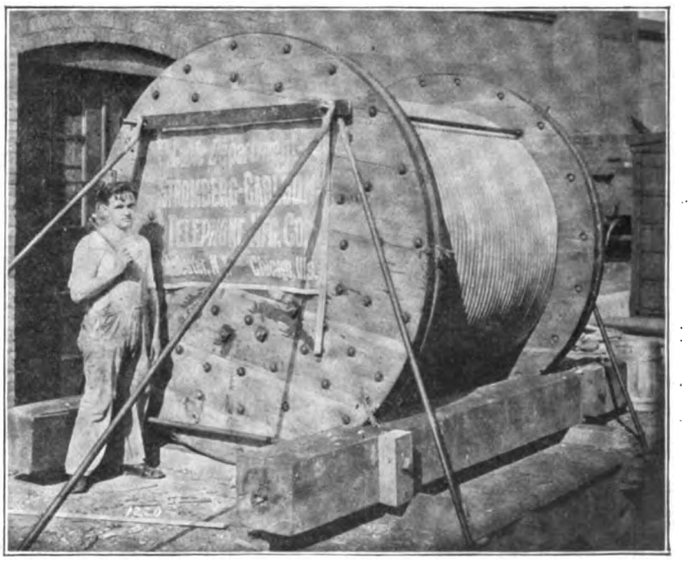

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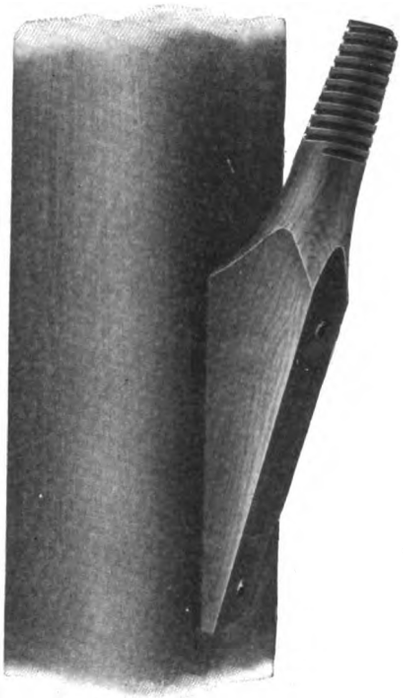

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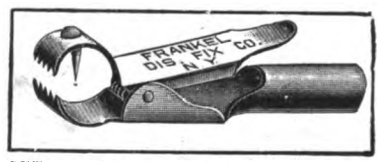

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THIS device will save both valuable time and material—THAT'S PROFIT.
The teeth grip the wire or binding post. The pin pierces the insulation and makes a perfect test connection.

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VOLUME XII *SATURDAY SEPTEMBER 30, 1905.* *NUMBER 14*

A Proposed New Method of Handling Toll Checks

ARTICLE II.

By Stuart C. Cross.

It is important for a clear comprehension of the following that the essential details of the recording system be clearly understood. To this end they are summed up as follows: A recording operator is permanently connected to a circuit to which all *A* operators have access by means of an order wire key. Each *A* operator can communicate with the recording operator by depressing the key. The recording operator can communicate with any one *A* operator, only when that operator has her key depressed. The recording operator has nothing to do but to write out toll checks as the information is received over the recording circuit.

So far nothing has been said about the manner in which the toll operator completes the connection after receiving the toll check.

The face of the toll board is equipped, in addition to the answering jacks and drops, with a multiple of the toll lines, and a multiple of the outgoing trunks to the various local switchboards. The keyboards are equipped with keys connecting the operators with the order wires to the trunk operators. This scheme is shown in outline in Fig. 4. The toll operator upon receiving the toll check goes in on the order circuit to the trunk operator at the exchange, where the call originated, and orders up the called subscriber's number. The trunk operator, having received the call, tests the calling subscriber's multiple jack in the usual way, and finding the tone test on it, takes it up, assigning the trunk in the usual manner. Upon the calling subscriber's line being taken up by the trunk operator, the light on the tone test cord indicates the fact to the *A* operator, who has originally answered the call, and she thereupon removes the tone test plug from the multiple.

While this process is going on the toll operator raises the distant toll point, and the connection is completed through one of the pairs of cords with which her individual keyboard is equipped.

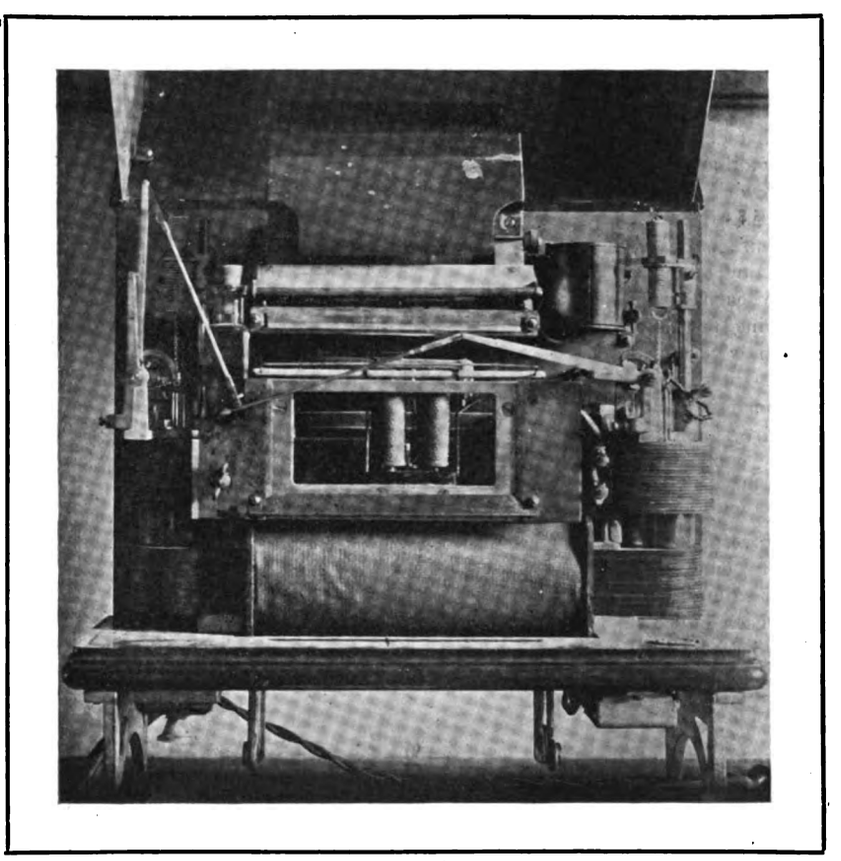

Fig. 7. The Telautograph Transmitting Instrument. Cover raised to show the mechanism. Pen in contact with ink well to the left. Controlling plunger magneto coils shown right and left of writing table, the open space in the center.

To sum up the essential features of the recording system before the proposed change in the method of handling toll calls is described. It consists in providing:

1. One or more circuits, called recording circuits, to which all *A* operators have access by depressing a key placed on their keyboards.
2. One recording operator permanently connected to the terminal of each recording circuit.
3. Orders for toll calls received by the *A* operator are passed over these recording circuits and received by the recording operators.
4. Recording operators have no other occupation than to write on a toll check the details of each toll call as it is received.
5. The *A* operator can communicate with the recording operator at will.
6. The recording operators have no means of communicating with the *A* operators except when the latter are in on the circuit.

The efficiency of the system depends upon the ability of the recording operator to receive the orders for calls without repetition, which condition is approximated as closely as the frailties of human nature will permit, by reducing the labor of the recording operator to a minimum.

The method proposed by the author calls for the use of the Telautograph, an instrument invented by the late Professor Elisha Gray, of Chicago, for reproducing handwriting at the distant terminal of an electric circuit. Its operation is based upon the principle that a motion in any direction is made up of two motions at right angles to one another. This is illustrated in Fig. 5, where the motion of a point from *a* to *b* along the line *a b*, may be considered to be made up of a motion from *a* to *c* along the line *ac*, and from *c* to *b* along the line *cb* at right angles to *ac*. A curved

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line may be considered to be made up of a series of straight lines called elements, the motion along each of which may be considered to be made up of two motions at right angles to one another as illustrated in Fig. 6, where the elements to the curve are shown at *ab* and *bc*, and their component motions at *ad, ab* and *be, ec*. The motions made in writing script, though seemingly complex, are capable of being resolved into a series of rectangular motions, just as the curved line shown in Fig. 6. In the construction of the telautograph this principle is made use of in the following manner: The pencil that is used to write is attached by a pantagraph motion to two resistances equipped with sliding

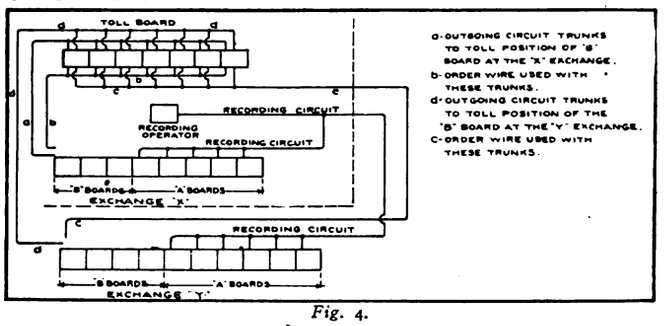

Fig. 4.

contacts, which are alternately increased and reduced according to the direction in which the hand moves. Each resistance is in series with an electro-magnet placed at the receiving end. These magnets have hollow cores into which fit plungers, and as the amount of current in each coil varies, the strength of the field varies, and consequently the magnetic pull exerted on the plungers. As a result, these latter move alternately in and out in accordance with the movement of the hand that does the writing. Attached to these plungers by a pantagraph motion is a pen or pencil, which, as the latter moves, reproduce the original handwriting.

In Fig. 7 is shown the transmitting instrument.

The proposed method of their use is as follows: At the recording table is placed a transmitting telautograph, as shown at *a* in Fig. 8, and on the keyboard of each section, midway between each operator, is placed a receiving telautograph, b_1 b_2 b_3, etc. Upon the recording table, within easy access of the recording operator, a row of keys similar to those used on order circuits, is installed. These keys correspond in number to the receiving telautographs at the toll board, and are so wired up that each one, upon being depressed, connects the sending instrument with one of the receivers. The keys and the plan of wiring are shown at c_1 c_1 c_2 c_3, etc. The key buttons are marked with letters or symbols which correspond to the respective toll points handled at the sections to which they are wired. By depressing the proper key, therefore, the recording operator is able to connect her sender with the receiver before the toll operator to whom she wants to transmit the ticket.

For example, should the recording operator receive an order for

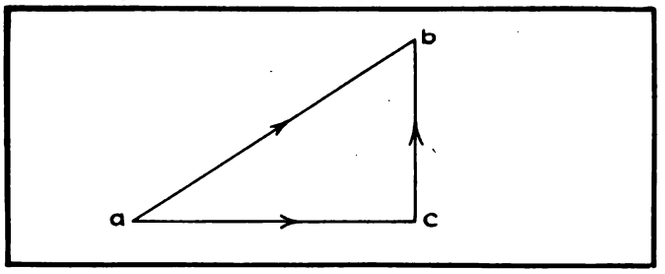

Fig. 5.

a call to the toll point "Ozark," she would depress the key marked "Ozark" and write the details of the call. The ticket would instantly be reproduced before the "Ozark" operator.

There are certain decided advantages connected with this system of reproducing the ticket before the toll operator over any system whereby the ticket is transferred to its proper destination. The successful operation of this system entails, however, some slight modification in the present system of operating by means of the recording system, which may prove to be more or less of a disadvantage. This point cannot be ascertained until the system has been thoroughly tried. In addition, the multiplication of recording operators, necessitates a modification of the system which makes it somewhat complicated. These three points will be thoroughly discussed in order.

First as to the advantages. The toll check being reproduced before the toll operator at the instant that it is written by the recording operator, the time taken to transfer it from one point to another is eliminated; and thus, comparing it with the best results of the pneumatic system, six seconds are saved on each call. There is absolutely no way for a call to be delayed except by the apparatus getting out of order, which from the nature of the mechanism is a remote contingency. Again, since both sending and receiving instruments are in plain sight, any derangement of the apparatus would be very readily detected.

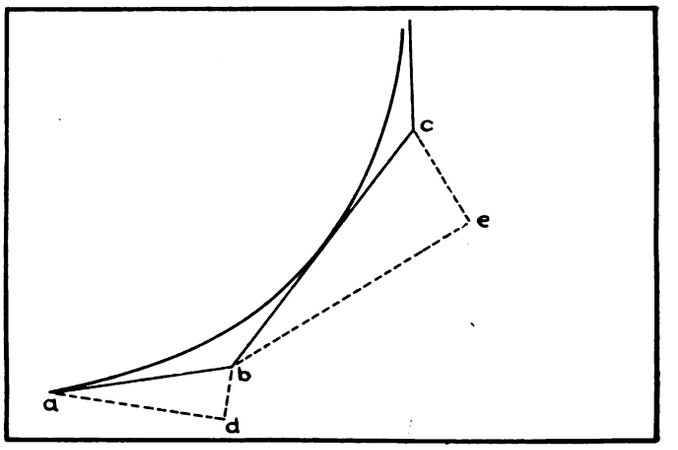

Fig. 6.

Second, as to the modification in the recording system. This point depends upon the method by which the calls are distributed. When the calls are distributed according to the toll point to be reached, the recording operator would have to know to what point the call was to go before she made out the check so as to enable her to depress the proper key. This would necessitate the *A* operators giving the toll point first, which is the reverse of the order in which calls are now passed. For example, under the present conditions in passing a call from No. 700 Cedar Rapids to No. 76 Southampton, the *A* operator would say: "No. 700 Cedar Rapids for No. 76 Southampton," whereas with the proposed method she would have to say: "Southampton 76 from 700 Cedar Rapids." This appears to be a small point, but carries with it a resultant issue which is of more or less moment. The recording operator would have to think of the toll point to be reached, and also of depressing the proper key before writing the check. This additional work might tend to slow down her work and probably would. It would also result in the beginning in a certain amount of repetitions or questioning over the recording circuit, which would reduce its efficiency and slow up the service.

If the distribution of the toll checks is made according to the

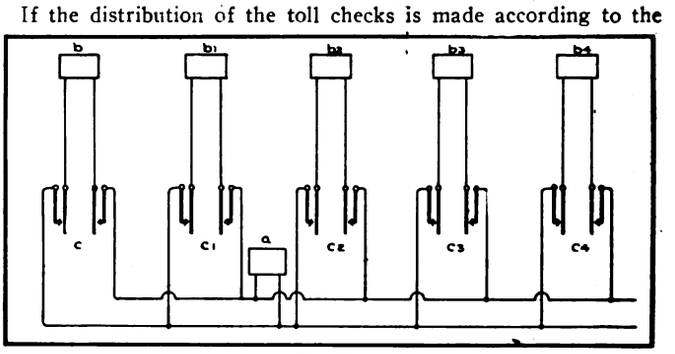

Fig. 8.

nature of the toll trunks, the same conditions would prevail, as far as the recording operator is concerned.

If the distribution is to be made according to the load on the toll operator, a distributing table would have to be introduced, as is the case with the pneumatic tube system.

(*To be continued.*)

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An Interesting Letter from an Independent Company

We take great pleasure in publishing the following letter, which was mailed to the people residing in the territory covered by the company's system.

R. E. UMBEL, President. JOHN M. CORE, Secretary. F. H. ROSBORO, Treasurer.

Md., Pa. & W. Va. Telephone and Telegraph Co.

COMMONLY KNOWN AS

The Tri-State

CHAS. A. BERG, General Manager and Superintendent

Dear Sir: UNIONTOWN, Pa., September 6, 1905.

The Tri-State Telephone Company begs to call your attention to the following facts: Fayette county first secured telephone connection with Pittsburg in 1889 through the Bell. This company had a monopoly and charged prices accordingly until 1898, when local Independent service was started by the Tri-State in Uniontown, Connellsville, Dunbar, Masontown and a few other places, with about 500 subscribers. This slight appearance of opposition, caused the Bell Company, while not changing its contracts, to allow such rebates as reduced the cost of its service almost one-half. This condition continued for several years; as the ownership of a controlling interest of the stock of the Tri-State fell into the hands of some Eastern Independent telephone people who later abandoned some extensive plans they had been contemplating. As the service became poor the popular impression was that the company had fallen into the hands of the Bell Company, and this was strengthened in the spring of 1903 when the Bell announced its intention of increasing the rental rates per year and imposing local tolls—that is, if a Uniontown subscriber called a subscriber at Connellsville, Dunbar or Brownsville he had to pay toll, and vice versa. This increased the cost of telephone service more than 200 per cent., and made it such a burden that only the favored few and wealthy felt able to bear it.

The late Ira E. Partridge got in touch with the Eastern people and learned that they still owned the Tri-State stock and that it was for sale. He laid the matter before our people, who purchased it and proceeded forthwith to improve, enlarge and extend the system. To-day it has twelve exchanges and 3,000 local telephones, with a long distance service connecting with over 1,000,000 Independent subscribers.

The Tri-State Company did not inaugurate, nor has it ever pursued, the policy of a telephone rate war; it started with and has ever maintained rates that, considering the extent and quality of its service, are very low. The Bell Company has a number of times had statements published, that would indicate that its local management has felt that a desperate telephone war has been raging here for over two years. It has been entirely one sided; we have done no warring, nor have we cut prices. We started out to give the people of Fayette county telephone service at reasonable rates and relieve them from the burden the Bell Company was trying to impose on them. The desperate efforts the Bell Company has been exerting to hold its place, is conclusive and abundant proof of our success.

Recently the Bell Company announced a sweeping cut in telephone rates which, in comparison with those it charged when we were driven into the business by its high prices, poor service and arbitrary methods, are very much lower. The reason for this reduction was the extension and superior service and reasonable rates of the Tri-State. If such is not the case, why is the Bell Company not making similar concessions and reductions elsewhere? When it raised the rates a few years ago, it insisted that it was a business necessity, as it was losing. If such were true, do you suppose this reduction would have been voluntarily made if it could have continued this monopoly? Not for one instant.

The Bell Company has a dozen or more solicitors in Fayette county taking new contracts from its old patrons and doing its utmost to secure new ones, urging that its rates are, or soon will be, equal to ours and its service superior. Don't be fooled nor hoodwinked. A study and analysis of the rates it proposes will convince you that there is a difference in the rates in favor of the Tri-State, that will amount to several times the legal rate of interest on the cost of a telephone. As to the service, if you have our telephone, we are satisfied; if you have not, we only ask a fair trial and comparison on local as well as long distance service. We have not had a solicitor in the field for nearly two years.

Past experience shows conclusively what may be expected, and what we will unquestionably get, if we do not keep and maintain our Independent service; give the Bell Company a clear field and it will soon raise its prices beyond anything yet attempted. Furthermore, we do not hesitate to state that inquiries have been made regarding the purchase of Tri-State stock that we confidently believe were inspired by the Bell Company.

It is not the purpose of the Tri-State Company to go beyond Fayette county in future development. We are a county company, owned by the citizens of the county, and expect to confine our extensions within the county, connecting at the county line with long distance Independent lines in every direction; it is therefore most important to the people of the county and equally so to us, that we encourage and patronize each other.

It is wisdom and economy to pay a reasonably fair price all the time for a necessity, rather than to encourage a monopoly by giving it your patronage at equal or even lower rates than Independents offer; because if it can strangle opposition it will then raise its rates skyward. The American spirit of reciprocity—HELP THE ONE WHO HELPS YOU—is as important in our smaller every-day affairs as it is in the broader field of international matters. Do not allow yourself to be carried away by well-trained, smooth-tongued solicitors who have no other interest in your welfare than to swell the income of the great Bell Company, composed of foreigners and Wall Street capitalists. Stand by and help your fellow-citizens of Fayette county who have helped and brought you these favorable conditions and who compose,

Yours very truly,

THE TRI-STATE TELEPHONE COMPANY.

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Telephone Traffic*

By Herbert Laws Webb.

IT must not be imagined that the great increase of efficiency shown in diagrams 5 and 6 is due solely and entirely to improved methods of signalling and improved apparatus generally. It is also due to more efficient operating and a more thorough study of the minutest details involved in the handling of telephone traffic. It remains true, however, that the improved apparatus is the fundamental cause of the increased efficiency, for with the standard apparatus of to-day we not only get signals having definite meanings, and so eliminate a fundamental defect from telephone switchboards, but we get absolute uniformity of working, and so are able to train operators more effectively and more systematically. We give the operators better tools to work with, tools which involve less mental labor and less physical labor, and we are better able to teach the operators how to use those tools most effectively, both because the whole group of apparatus has become more scientific, and because the study of all the features of telephone traffic has become more scientific. The gain in efficiency of the telephone connection would be

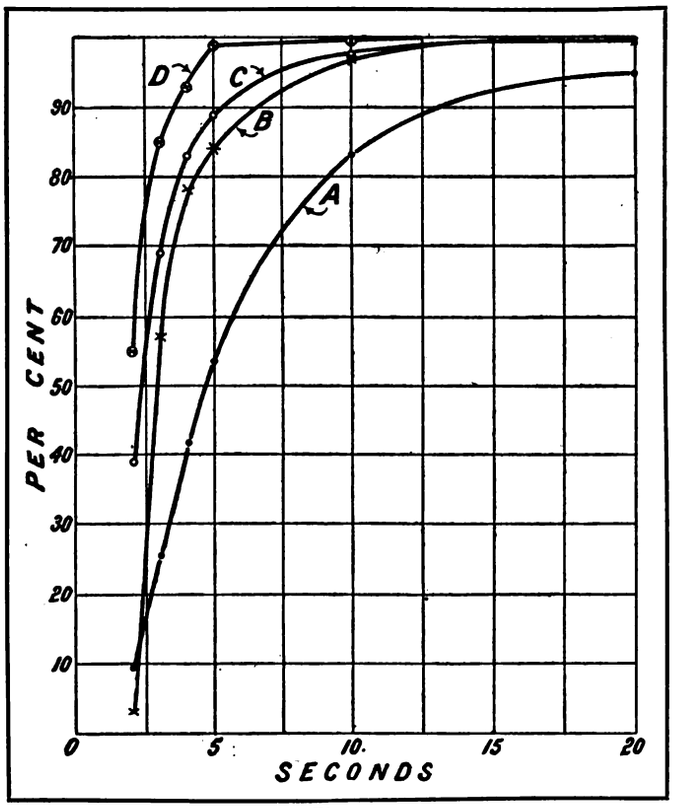

Fig. 7.

much less than it is, if the introdution of accurate and automatic apparatus had not been accompanied by the adoption of systematic methods of instructing and training operators, of supervising their work and of continuously observing and testing the service. The preliminary training of operators is a most important point in a large and complicated system. In the old days, with a variety of types of equipment in use in the different exchanges, it was impracticable to establish a really effective training school. To-day, with uniform equipment in all exchanges, a training school where the embryo operator learns her work by the practical manipulation of the same appliances as she will handle in the regular exchange is a most natural institution. At such a training school more progress is made in a month in turning out an efficient operator, than was formerly made in three months by the method of letting learners listen-in at a working position, and gradually pick up the work by experiment. In any large system a training school is absolutely necessary for teaching operators the general methods of the work, the proper terms to use, the geography of the exchange districts, and so forth, but the course is relatively ineffective unless it includes practice with the actual appliances the operators are to handle, and practice in answering and completing calls; thorough practice of this kind is difficult to give unless the exchanges have a uniform type of equipment.

The general supervision of the service becomes much more effective with standard apparatus, because the lamp signals are much more easily observable by the supervisors than indicators are. Standing behind the operators at a relay switchboard one can practically follow every movement of the subscribers' telephones; a line signal unanswered or a pair of supervisory signals unattended to glare insistently until the operations demanded are performed. The supervisor's attention is instantly called to any unusual rush of calls, to any difficulty or delay.

The constant observation of the traffic is the measure which has contributed most to the effective use of modern apparatus, and to the attainment of a high standard of efficiency and accuracy in the operation of a large daily volume of telephone traffic. It is only by making continuous tests on a certain proportion of the daily traffic, noting not only the time of every step, but the method and manner of conducting every part of the operation, that sufficient information can be gained of operations involving so much detail, to enable defective methods of operating to be eliminated or checked, and suggestions to be evolved tending to a general increase of efficiency.

Some idea of the complexity of telephone traffic may be had from the fact that the form for recording these service observations contains forty-two columns, each with its appropriate heading. An entry in each of these columns would not be made for a single call, but the test of one connection might require notes in a fair proportion of the columns, and even if but very few entries are made, each test or series of observations contributes its quota of information relative to the speed, the accuracy, and the general efficiency of the service. To set all these observations out on a diagram would hardly be interesting, and I will only say that the observations give the time, in seconds and fifths, of every stop of the connection, the result of every connection, whether effective or ineffective, and if ineffective from what cause—engaged, don't answer, cut-off, wrong number, subscriber left instrument, etc.—the mistakes and omissions of the operator or the subscriber, for even telephone subscribers are known sometimes to make mistakes—and in short, every ordinary vicissitude that the telephone connection is subject to. The information gained by a large number of tests of this kind, in which observation is made of every detail in the brief history of the telephone connection, is of enormous value in bringing to light the weak spots in the service, whether they be due to defects or faults in the plant, to slowness, inattention, lack of co-operation or lack of method, or erroneous methods on the part of the operators. I hardly like to hint that there may be sometimes lack of method, or erroneous methods on the part of the users of the service, who may thus contribute to the errors and delays which sometimes occur in the daily stream of telephone traffic; but if there are, continuous service observations will reveal them, and measures may then be taken to suggest such reforms as seem advisable.

To secure speedy and accurate operation of the vast volume of traffic which flows daily through a large telephone system requires first, that the apparatus used have signals of definite mean-

* Third series of extracts from paper read before the British Institution of Electrical Engineers.

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ing, that the working of the apparatus be largely automatic, and that the apparatus be of uniform type throughout the system; second, that the operators be thoroughly trained in the manipulation of the apparatus and in the methods of dealing with all varieties of calls before being entrusted with the conduct of actual traffic; third, that the operators be continuously trained to active co-operation with each other, so as to produce general efficiency, and to accuracy and method in every detail; fourth, that a constant study be maintained of the actual conduct of the traffic, directed to the improvement of the standards of accuracy and speed.

Mr. Gill, discussing Mr. Webb's paper, said in part: I do not think sufficient stress has been laid upon the organization that is necessary to deal with the traffic. If you put in the same equipment as there is at New York you will not get the same results; you must do something more; you require to pay constant and most careful attention to minute details. I do not know of any other department in ordinary life where one requires the same instant attention as one does on the telephone. If you go into a shop, or into a post-office, or a railway office you are content to wait your turn, but when you get on the telephone line you are very much more peremptory. I do not complain of that, because I think it operates to the good of the service, but it makes details very important. I should like to give some results which have been obtained in England on local calls. I do not for a moment put them up against the New York figures, because the conditions are entirely different; I simply give them for what they are worth. The first case is Nottingham, and I have selected it because at Nottingham there is the particular type of board which Mr. Webb referred to. From O to A, that is from the call to the answer, took 4.4 seconds, a little longer than New York, which is 3.6 seconds. At Hull, with another relay equipment, it took 4 seconds. I have not got exactly the same steps as those given in the paper, so I will take a big step from O to D. At Nottingham it was 22 seconds against 30.39 seconds at New York. I do not attach any importance to that reduction; it is possible that the subscribers in Nottingham answer a little more quickly and probably there are fewer residences on the exchange. At Hull, from O to D took 20.5 seconds; then, as regards disconnection, at Nottingham it took 4.7 and at Hull 3.8 seconds. These are not isolated tests, they are the results of many tests and may be taken as reliable. Isolated tests taken here and there are not of the least use; you might as well leave them alone. If you want to do any good at testing service you must test continuously.

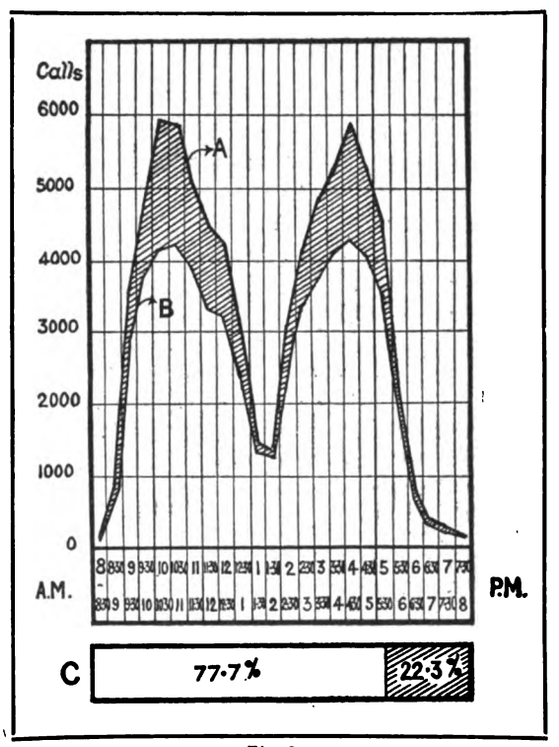

Fig. 8.

Figure 7 shows some other results as regards the speed of answer. The seconds which are observed between the time the subscriber calls and the time the operator replies to him, are plotted against the percentage of calls which are answered within the time. Curve A and curve C are for exactly the same exchange; it happened to be a magneto exchange. The average time for A was 7.4 seconds. Then we did a little organizing; a new man was substituted, and he produced C with the same apparatus. C gives an average answer of 3.5 seconds; and you can see from the shape of the curve that it is not only very much better than A, but is also good in itself. B is taken on a standard relay equipment; that is also good. D is taken on another relay equipment; it is not quite what we call standard, but it is a relay equipment; it has double supervision and is a very fair type of board. The average time of D is 2.7 seconds; and you will see that 99 per cent of the calls are answered in less than 5 seconds; while 76 per cent. of the calls are answered in less than 2½ seconds. All these curves are the results of a large number of tests.

The paper largely turns upon the use of common battery apparatus, and among the reasons why this type of apparatus has become so universal as practically to put out of account the construction of any other type of equipment, are that it enables one to simplify the subscriber's instrument and concentrate a highly specialized series of apparatus at the exchange where it can be properly looked after, and it permits the introduction of a large number of semi-automatic devices set in motion either by the operator or, unconsciously, by the subscriber. The co-operation on the part of the subscriber required by other systems is in fact too often absent, as illustrated by the author in the matter of speed of disconnection.

One sometimes hears the common battery system spoken about as if it were merely a particular kind of switchboard made by one manufacturer, and I have even seen it asserted that in the United States only the Bell companies use it. The official census lately published by the U. S. Government shows that in December, 1902, there were in use by the Independent systems 481 common battery exchanges against 356 such exchanges in use by the Bell companies. No doubt those used by the Bell companies embraced the larger systems, such as New York, Chicago, Boston, etc., but these figures clearly indicate that the Independent engineers also appreciate the advantages to be derived from relay equipment. In this country the National Telephone Company is following the same course; apart from the provinces it has now in hand a large conversion scheme in London. During the last twelve months common battery exchanges have been opened at Holborn, London Wall, North, and Sydenham; there are also in course of construction similar equipments for Hop, East, and Brixton, and there are others in various stages of preparatory work. The whole forms a scheme for complete relay working in London, but of course until the alterations are further on, one cannot hope for the full benefits of the change.

Mr. W. Napier communicated in part as follows: The subject selected by Mr. Webb is of the greatest possible interest to telephone engineers. It is only by a careful study of the details of telephone working that the requirements of this great organization can be ascertained and catered for. Important points which will have appealed to many are, first, absolutely reliable signals; secondly, effective supervisory signals which respond to the movements of both subscribers, and obviate the necessity for listening in on the part of the operator; thirdly, the simplest possible apparatus at the subscriber's end. Mr. Webb has touched very lightly on an essential point in the production of a good telephone service, viz., the absence of the reply, "Number engaged." This undoubtedly depends to a great extent upon reliable signals, the duration of connections, and the renting by subscribers of sufficient lines for their traffic. The question of rates, however, is one which must in the future receive fuller consideration. Taking the percentage of ineffective calls as twenty to twenty-three in a large exchange, it is readily seen that a large percentage of the costs for operating, apparatus, maintenance, etc., is involved, and that a reduction in this ineffective work will mean increased efficiency. The following

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observations were made in the Manchester Telephone Exchange.

The loss in one day due to engaged lines is shown in Fig. 8, *A* being the total calls, effective and ineffective, and *B* the effective calls only. The shaded portion therefore represents the waste, amounting to 22.3 per cent. as shown on *C*.

Other tests proved that the percentage of engaged lines depends upon the rates and class of service to which the subscribers required contribute. The applications for flat rate sub-

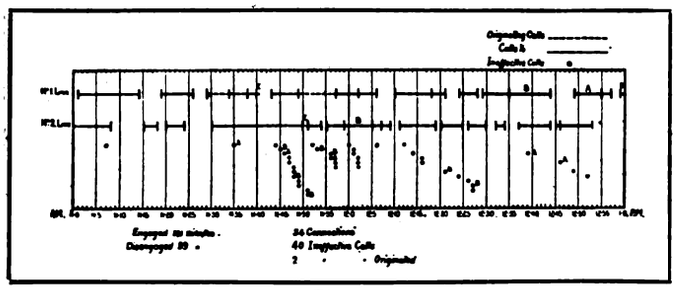


Fig. 9.

scribers averaged 22.9 per cent. in effective per day, while applications for message rate subscribers only averaged 11.3 per cent. ineffective per day. Message rate subscribers pay per message and naturally control their traffic.

Fig. 9 illustrates a case in which two exchange lines are rented by a subscriber and are totally inadequate to carry the traffic, the system being one in which subscribers ring through and can maintain a connection, although both parties leave their telephones. The diagram is divided off into minutes (120), so that with two lines there are 240 available minutes. The horizontal lines represent the durations of the connections, the continuous lines being connections to the subscriber in question, and the dotted lines the calls originated. Each single dot represents an ineffective call due to both lines being engaged. *A* and *B* represent repeated calls and connections confined to two callers, *A* and *B*; *E* calls originated by the subscriber for engaged lines.

The number of ineffective calls for these two lines between 11.45 a. m. and 12.30 p. m. is specially noticeable, and demonstrates the disadvantages of rates and systems which enable callers to have connections of length and frequency which debar other callers and necessitate unproductive work. Up to the present this subscriber has not been induced to add to his lines, and the case is merely a sample of many in large exchanges. The relationship between traffic and rates is undoubted. There can be no doubt that traffic studies will pay the telephone engineer, and as millions of connections are involved the most minute detail is worth careful consideration.

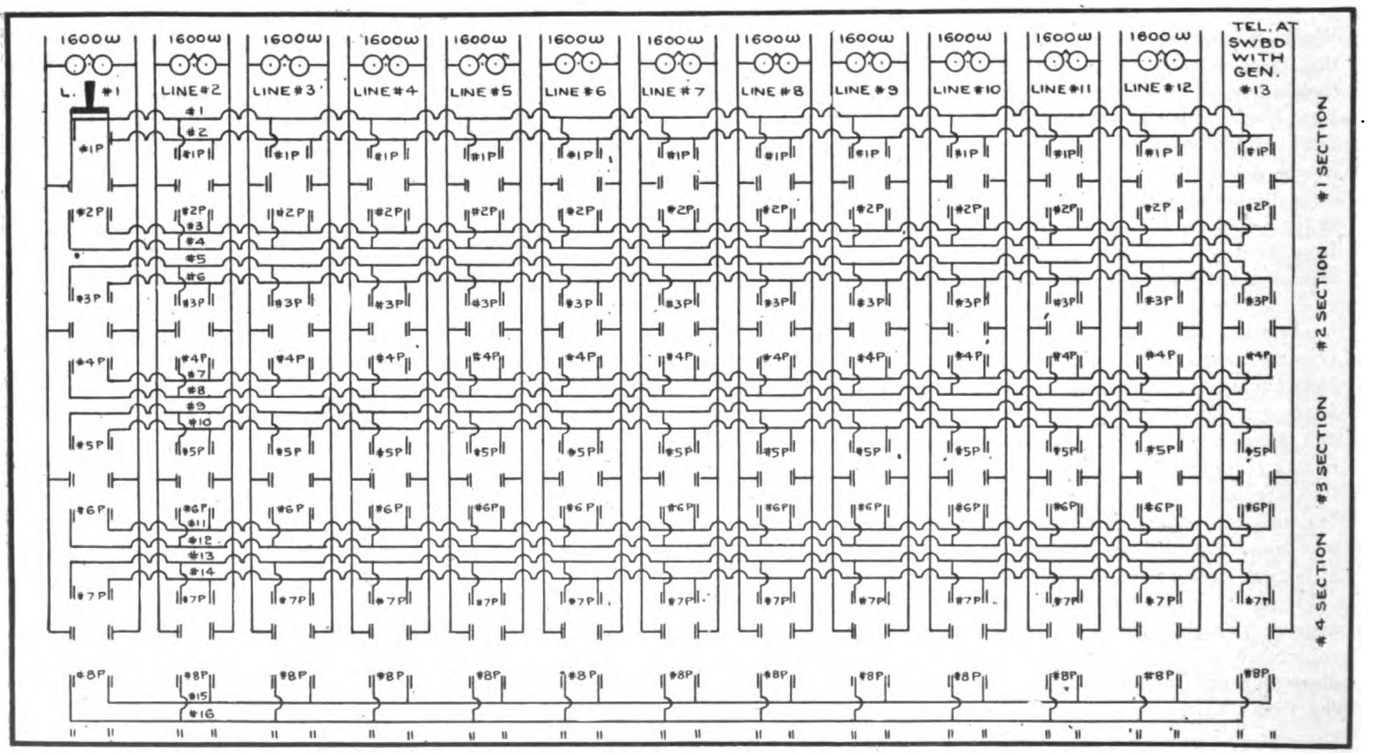
(*Concluded.*)

A Cordless Switchboard

By John N. Von Nagel.

IN the accompanying illustration is depicted a novel type of cordless switchboard, which was designed by the writer.

Its essential feature consists of the employment of double-point double-throw switches, in place of the regular cord plugs and cams. A board of this description is simple to construct, and will be found to offer a number of advantages. First of all, simplicity of operation. Second, ability to get at all of the working parts. Third, in case of trouble it can be easily examined, as all connections are made on the front. An additional advantage, exclusive of those already mentioned, is that this type of board can be increased in capacity at any time, with very little trouble. For instance, if there are only four lines, five switches will be sufficient, one for each line and one for the operator. If an additional line is added, the switches will have to be increased to twelve, installed in two sections, six in each. This is shown in the drawing. If the number of lines is still further increased to twelve, which can readily be done where two sections are employed, two switches will be required for every line, making a total of 26 in all. This holds, however, only where the board is not a busy one, and one operator can handle the business. In operation all switches must be open when no connection is up.



Circuit connections for cordless switchboard, showing arrangements of double pole double throw switches.

The operator's set may be an ordinary wall or desk instrument with a bridging generator. The circuits from this instru-

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ment should be connected to the last set of buss bars, the same as a subscriber's line. Now, if No. 1 calls, No. 1 switch in section 1 is thrown up, and also No. 13 switch in section 1. Nos. 1 and 13 are now connected by cross connection wires 1 and 2. As No. 13 is the operator's set, she is enabled to talk to No. 1 party. Suppose No. 4 party is wanted, then No. 4 switch will be thrown up in section 1 to correspond with No. 1 switch, and, by opening No. 1 switch in section 1 the operator can ring No. 4 party. It is necessary, however, for her to press her receiver hook down. Party No. 4 answering, the operator turns No. 1 switch to its upward position and opens No. 13 switch, which puts the parties in metallic connection and disconnects the operator's set. If No. 2 calls, throw No. 2 switch of section 1 down ,also No. 13 of section 1 down; this will cross connect lines 3 and 4, giving operator direct connection with No. 2, without any interference with parties 1 and 4. If No. 2 wishes to talk to No. 10, then No. 10 switch on section 1 must be thrown down, and a similar operation performed to ring as was required to secure connection with No. 4 subscriber. If No. 5 calls, the method of procedure is similar, only that the switch connections are now made in section 2, using either an upward or downward movement of the switches to secure cross connection with operator's set over wires 5 and 6 or 7 and 8. From this description it will be apparent that four parties can talk together at one time without any interference. After connections are through, all switches should be returned to normal positions.

It is interesting to note that, from a trouble standpoint, there are no drops to burn out, become grounded or open, or shutters which refuse to fall on long overloaded lines; no cords to get noisy or worn out, no plugs to become short-circuited, or keys to become open or grounded. In fact, some of the greatest troubles found in the ordinary type of board are eliminated.

General Traffic Work

By H. R. Jacquette,
Chief Service Inspector Keystone Telephone Co.

THE aim of all traffic managers of telephone companies is to give the most accurate and rapid service with the minimum number of operators, as operators represent the hea expense of a traffic department.

One of the most essential points in traffic work is the proper spacing or placing of the call numbers of the various subscribers in the answering jack section of the switchboard. It is a great mistake to assign subscribers operating numbers to the answering jack sections in their numerical order. They should be so placed that they will equalize the amount of business done at each position of the switchboard, and in working this idea out one can get a very good idea in what section to place the number of a new subscriber, by carefully considering the particular class of business the subscriber is conducting.

Take an instance of where an operator has to answer the calls of sixty or a hundred direct line or unlimited subscribers; in addition has several branch exchanges assigned to her; these exchanges have in turn two or more trunks running into the same position. This means that this particular operator will be overworked, and some of the subscribers in her position of the board be neglected.

If one of these branch exchanges is selected, and one of its trunks is cross-connected to a position where the number of calls per hour do not average so many, and do the same with a trunk of each of the other branch exchanges; the amount of calls on the original position will become less. By this method of lightening the load on the original position, the branch exchange subscriber will have two different operators at central to do business with. This is partly a disadvantage to the subscriber, but on the whole is a great benefit to the service.

In addition it is a good idea to take some of the unlimited subscribers lines out of this busy position, and cross-connect them to another section of the switchboard, where the positions do not average as many calls per hour, and then some of the lines of less busy subscribers can be cross-connected to the position that was just lightened. It is well to select the lines of two party unlimited telephone subscribers, and by this means load up the positions, without overloading the operator. This cross-connecting is a bug-a-boo to the maintenance chief and his various assistants, but if the records are kept properly they will not have much trouble in locating various cross-connected lines.

Traffic managers of companies having a varied assortment of contracts, such as direct unlimited, direct measured, two-party unlimited, two-party limited, and lines having more than two parties on them, and whose contract calls for a limited number of calls per year, have in some instances mixed or assigned the lines of the limited service subscribers to answering jacks on positions having unlimited subscribers lines as well. This is a mistake, as it means confusion to the operator, mistakes in records and slow service. These limited lines of all classes should be assigned to a section of the switchboard set aside for that purpose, and operators handling them will, by having just the one class of service to handle, give better and more accurate service. Tickets, if such are used, and which are always a trial to both traffic managers and to auditors, will not be made out for calls made by unlimited line subscribers in mistake for calls made by limited line subscribers.

There is only one method or way to handle or record the calls made by a user of a measured service line. This is by having the instrument of every measured service line equipped with a registering device. Then the subscriber registers his own calls at the request of the operator, who, in turn, gets his signal over the line before connecting the calling subscriber to number called.

Pay station lines are generally assigned to a certain section of the switchboard, and in no case cross-connected from one position to another. Many traffic managers may not agree in this, but trial has shown it is far better to keep the different classes of pay station service separated. This applies to the larger companies, as the smaller companies having small exchanges or only one exchange cannot so allot the space on the switchboard.

The circuits of a company having two or more local exchanges are a class of service that needs the most constant watching. More mistakes, temporary disconnections or cut-offs are made on the circuits to another exchange than elsewhere on the board. This in a great measure can be avoided by having the correct number of incoming trunks to a circuit position.

No circuit operator should be asked to work to her limit, except during relief hours. Then it may be necessary to switch two or more order wires into one. The exchanges so affected should be immediately notified, and the operators on the "A" or calling side of the exchange, advised not to break in over one another's call to the circuit operator in the other exchange.

The proper training of a youth or girl to be a telephone operator in a large exchange is one of the most essential parts of the service. Care should be used in selecting the candidate for an operating position, and they must have the following qualifications:

First—Age, not less than seventeen years.

Second—Height, not less than 5 feet 4 inches.

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Third—Reach, 30 inches.

Fourth—Eyes, tested by means of an optical test sheet at the various distances, and a strict inquiry made into the normal physical condition.

The beginner must first be thoroughly coached in the different terms used by the operators; in the interpretation of the various signals or markings used on the switchboard; in the name and use of each part of the switchboard; the equipment she will have to work with; the different classes of service and method of handling same; and the reason for so handling that class of service. After becoming proficient in answering such questions she must be placed at the switchboard with a competent operator. After a week of such practice, followed up by duty during evening hours, a light position on the board and gradual advancement will lead to rapid improvement.

Excellent results are obtained by sending a girl to one of the smaller exchanges for two or three weeks, transferring her back to her original exchange for a month, then again transferring her to another of the smaller exchanges, and finally transferring her back to one of the busier exchanges. This, of course, applies to those companies, having several exchanges centrally or conveniently located, in the same town.

The larger companies are, and have been, employing men in the position of traffic inspectors, or, as they are generally called, service inspectors. Their duty is to investigate complaints, make time tests on operators and chief operators, time calls to toll and long distance exchanges; and test the length of time it takes an operator to complete a call both in her local exchange and to another exchange.

All tests are placed so that they will not occur more than once in every three minutes, and so spaced that they will come up in the answering jack of some other position, so that a different operator has to answer the same. Talking tests are made by inspectors working in pairs, but the best results are obtained by tests made from the subscribers station. This keeps the department headquarters in direct touch with the subscriber, and when a complaint does occur the traffic inspector, knowing to some extent that patricular subscriber's peculiarity, is best able to deal with him.

The mere fact of the operators and other exchange employees of the operating department, knowing that the traffic inspectors will make a test at any unlooked for moment, has an excellent moral effect on the general work of the department. The results of these tests must be sent daily, as made to the exchange manager or chief operator. Where a telephone service reaches the low average of three and one-half seconds, it is getting to a point where it is difficult to clip off another fraction of a second. A three and one-half second service is as quick as can be wished for, and the traffic manager gets off with the minimum number of complaints by not pushing operators to answer signals in too quick a time.

But it is quite unreasonable to suppose each call made is answered in that time. Long answers make the maximum larger than it should be, and in that case it is well to keep in touch with the operator causing the same. All tests answered in eight seconds or over should be especially noted, giving the subscriber's line number and the operator's number answering them. All chief operators and directory clerks answering a test in twenty-five seconds or longer should have their number noted for future reference. By this method it is quite easy to locate the operators giving slow service and the chief operators and clerks giving both slow and inaccurate information.

Should a traffic manager plan to obtain good service, he requires the thorough co-operation of the maintenance department in clearing up lines, instruments, switchboards and inside troubles of a mechanical kind in a quick and thorough manner. Good maintenance goes hand in hand with good traffic work, and the traffic manager and his assistants must have a working knowledge of the maintenance end of the business.

All automatic pay station signals should be tested by the collector when he makes the collection from the same. This test is made with the co-operation of the chief operator or one of her assistants.

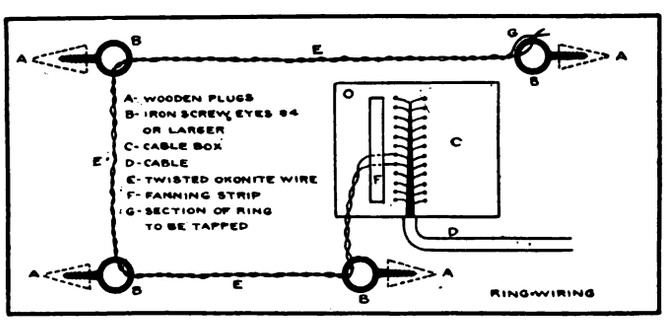
A point that some traffic managers ignore is the matching up of two or more than two party lines. Care should be used not to assign a residence line to be paired with a produce dealer, grocer, butcher, baker or milk dealer's line; on the contrary, the residence line should, where practicable, be assigned to the small business man's line, whose place of business closes before or at six o'clock p. m.

Care and judgment used in the assignment of one party line subscriber to another, will prevent complaints and expense in men's wages and time and also greatly add to the efficiency of the service and assist in the operation of the circuits.

Ring Wiring and Distribution

By L. H. Hammersley.

CIRCUIT distribution in closely built districts is a problem which differs largely from that encountered in suburban or rural localities. The most improved method utilizes a scheme called The Block. In the centre of blocks consisting of the area enclosed within four streets, terminal boxes are installed. From there the twisted pairs are run through rings



Ring wiring showing details of installation.

fastened to fences or walls, and in this manner distributed to the subscribers' stations. The cable leading to the terminal box is brought in underground and the box placed in a dry cellar to which access can be readily secured at all times. The supports employed for this method of distribution consist of iron screw eyes or rings not smaller than No. 4, and of sufficient size to allow all the present and prospective lines along any route to readily pass through them without binding. These supports should be covered with an insulating enamel which not only adds to the resistance of the line in damp weather, but also prevents to a large extent any chafing of the insulation when the wires are pulled in.

These rings are shown at *B* in the accompanying illustration. In placing them, if in brick or stone, the hole should be drilled and a wooden plug driven in to give a sufficiently strong holding point for the screw thread. Insulated rings should never be driven in, as by so doing, the enamel will be cracked off, destroying its insulating quality, and also forming a rough surface upon the ring which will wear away the insulation upon the wire. For turning corners, rings with angle irons in place of the screws should be employed. Where the line route is along fences no trouble will be experienced in screwing the eyes to the woodwork. At the final ring where the twisted pair leaves the run to enter a subscriber's premises, it should be tapped off as shown at *G*. This gives additional strength to the circuit and prevents the wires slipping.

This method of distribution is sightly and affords excellent protection to the circuits in cases of storm, by holding them close to the building or fence, which acts as a shield against the wind.

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QUERIES

GROUND ESCAPE.—(606.)

In testing our lines with a voltmeter and battery I sometimes find the voltmeter indicating a ground, sometimes as low as 500 ohms, but generally above 3,000 ohms, with the battery flowing in one direction the voltmeter shows a steady ground; upon reversing the battery, the voltmeter needle comes up to the former indication and then slowly falls back to within a few points of zero. Can you inform me why the needle falls back, and what the direction of the battery current has to do with it. W. V. N.

The trouble you mention is a slight ground on one side of the line and is termed an escape. In general it is due to poor insulation. This may be either inside the building where the instrument is located, or else out of the line. It will be found to occur more frequently in damp or rainy weather, when the reading will be heavy. As the insulation dries out the resistance to ground through the faulty spot increases. The reason that you

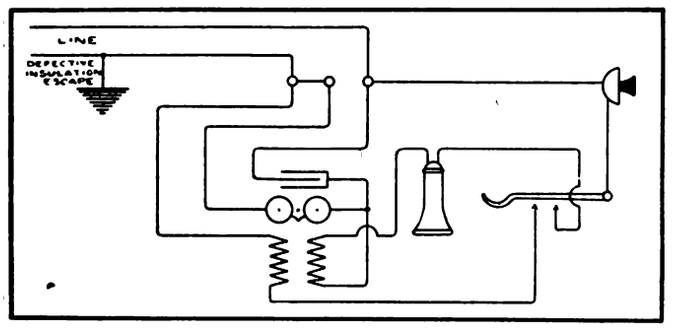

Fig. 606.

have a steady reading on one side of the line and not on the other is this: The battery and voltmeter are in circuit with the ground. When your reversing key connects this circuit with the side of the line showing an escape, Fig. 606, you will have a direct reading proportionate to the resistance of the fault. When you reverse and throw the voltmeter circuit in series with the other side of the line there will be a momentary flow of current to charge the condenser. On a short highly insulated line the voltmeter needle will more quickly cover the scale and back again; but on a long line, or one not so highly insulated, the forward movement of the needle will be rapid, but it will move back slowly. This is due to increased capacity and to the fact that the insulation resistance being lower, more current passed over the circuit. It is almost impossible to keep lines free from escapes in damp weather, but they should test clear in dry. If a line shows this trouble, test it out in sections by having it opened at the junction of the aerial with the underground, at the subscribers terminal pole and at the arrester. By pursuing the method of testing the trouble can be definitely located. If inside the building it is probably due to dampness, which may occur at the hole where the wires enter, at points where the wires are supported to the wall or in the instrument itself.

LIGHTNING.—(607.)

Can enough lightning pass through a ¼-ampere fuse to kill a man? G. F. L.

When lightning strikes, its effects are instantaneous, and for this reason a ¼ ampere fuse may carry much more than its rated capacity without volatilizing. Lightning is simply the name given to a discharge of electricity coming from or induced by a cloud. When it is dissipated by means of a lightning arrester its entire effect does not last over an infinitesimal part of a second. A ¼ ampere fuse will not melt with ¼ of an ampere unless a certain amount of time passes during which it heats up. The shorter this period of time the less chance of the fuse blowing for the self-same reason. On these grounds an instantaneous discharge of electricity would have to be considerably more than ¼ of an ampere to blow the fuse. As the very word lightning means a high pressure discharge (what is technically called a disruptive discharge), a pressure that may reach into millions of volts, and as the current passing in a thousandth of a second or less would be considerably more than ¼ of an ampere if it melted the fuse, it is evident that a discharge of this character would probably kill if it struck a man.

A lightning discharge is not a single flash but a rapidly recurring series of discharges back and forth, sometimes reaching millions per second. The bodily destruction is due to the amperage passing through the system. A ¼ ampere fuse should not be a temptation to run any unnecessary risks as far as lightning is concerned.

SNEAK CURRENT PROTECTION.—(608.)

What is a sneak current and how is it protected against? C. L. T.

A SNEAK current is a current of low amperage which, if allowed to flow for any appreciable time through coils of drops, bells or other apparatus, will generate sufficient heat to burn the insulation of the wire and thus destroy the coil. Sneak currents are particularly dangerous because they do not manifest themselves at once; their presence being detected only after the damage has been done. To protect against these harmful effects a device termed a heat coil has been devised, one form of which is illustrated in Fig. 608.

It consists of a brass rod *R* over which is placed a copper sleeve *P*. This sleeve is held in position by a small amount of solder. Over the sleeve is wound a few turns of No. 37 B. & S. insulated German silver wire *I*. This device is enclosed in fibre envelope *B*. *T* is a projection of the fibre, the purpose of which is to permit a sufficiently strong support for the screw

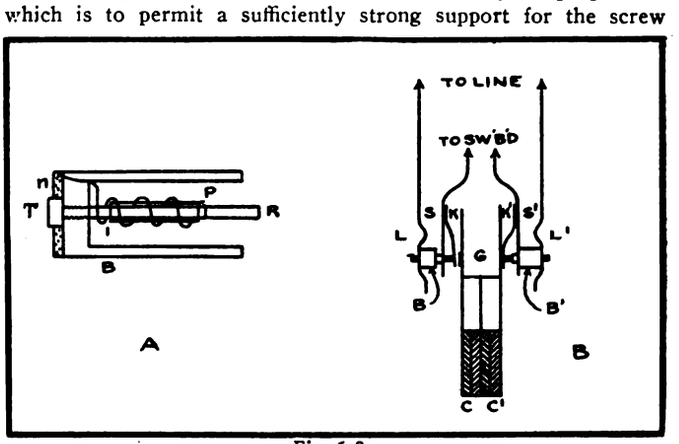

Fig. 608.

end of the rod *R*. *N* is a copper plate to which one end of the German silver coil is attached, the other end being fastened to the sleeve. The application of this device is shown in Fig. 608*b*. *L* and L^1 are the terminals of the line wires of a pair at the main frame. *S* and S^1 are the terminals for the switchboard wires. *K* and K^1 are small springs attached to the terminals *S* and S^1. *C* and C^1 are the carbon blocks for lightning protection, and *B* and B^1 are the heat coils. The normal position of the coil is with the outer edge of the sleeve *P* (Fig. 608*a*) pressing against the strip *S*. This prevents the point of the rod *R* forcing the spring *K* against the ground plate *G*. When a current of sufficient strength passes through the heat coils, it causes the solder holding the pin *R* to the sleeve *P* to fuse and the pressure exerted upon the rod *R* by the spring *L* causes it to slide forward and force the spring *K* into contact with *G*, thus grounding the line.

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THE EDITOR'S PAGE

EXPERIMENTS IN SUBMARINE TELEPHONY.

LAYMEN are not aware of the difficulties suggested by the phrase "submarine telephony." It is hardly within their province to realize the meaning of theoretical or practical limitations in connection with this subject. Yet a feeling of expectation has been aroused, due to a widespread belief that whatever such drawbacks may be, they but temporarily arrest the grand result. Fortunately these expectations do not belong to the category of illusions. They are more substantially founded than a casual review of the circumstances would seem to indicate. There is a basis for the belief that some day New York and London will speak together through the silent abyss of the ocean. And the foundation, for a practical realization of this new Twentieth Century miracle to be, lies rooted in the principles of relationship existing between electrical capacity and inductance.

The cable must needs be a gigantic condenser, whose inner conductor is one plate, and whose sheath and the great watery mass around it the other plate. Between the two the cable insulation acts its part as a dielectric, through which medium, according to its specific inductive capacity, the electric influence will extend. A current sent into the conductor proper can only traverse the metal length at its disposal, with rapidity and freedom, if retarding and disturbing forces are eliminated. To charge a condenser takes a period of time proportionate to the potential applied and its capacity. To send an impulse of current through a great submarine cable would likewise take time in proportion to its capacity. But through this time element, as now understood, is the ever present reason, why a weak current impulse when sent in would disappear in this comparatively large capacity as completely as a drop of water in the ocean unless the cable is already charged. Still it is evident that though a single impulse of a weak character would be lost, it is well understood that the loss is only because of the existing capacity of the cable and for no other known reason. In other words, the cable is like a huge absorbent mass at present, to which if a drop of water is touched, it is immediately swallowed up. The present cabling system is really one of saturating the cable with electricity—charging it—with each electrical impulse.

Between the cable core and the sheath is the insulating material, generally gutta percha. The degree to which this dielectric calls for the electrification of the outer coating, is a measure of the time it takes to send an impulse from one end to the other. It is easy to realize that if some neutralizing element were interposed, even though the dielectric remains as it is, the cable capacity might not exercise its absorbing properties so completely as before. Carrying the logic a little further, it seems that the introduction of means whereby the capacity is so neutralized, as it were, that the conductor becomes comparatively free in an electrical sense, would be the grounds on which to expect improved speech transmission.

The correct adjustment of inductance, along the length of a cable, is the method suggested by a theoretical interpretation of existing conditions. Regarding the cable as a huge elongated condenser, unfortunately made so by the use of an insulation whose dielectric properties produce this effect, simplifies the proposition.

Experiments in submarine cable telephony must therefore be conducted with reference to the strict requirements of the problem. To successfully transmit the delicate tones of the voice, as reproduced in the form of current waves, the cable must be a comparatively neutral conductor. To make it so inductance must be employed throughout its length. Experiments along these lines are the best indications of coming success.

They represent the basis of that future expansion of the telephonic art which, reaching across the Atlantic, will be the means of effectively welding the intelligences of two great continents.

MYSTERIOUS TELEPHONE SOUNDS.

THE extreme delicacy of the telephone receiver makes it respond to the faintest of electrical stimulations. Currents that can hardly be perceived, even by the most sensitive of laboratory instruments, are able to awaken within the telephone strange and sometimes discordant noises, which, striking the ear when only silence was to have been expected, arouse impressions of a most vivid character. In the early days of telephony, when the earth formed a return for all circuits, more powerful currents ravaged the wire. Currents arising from the mysterious depths of the earth. Or currents created by some equally strange combination of solar disturbances and electric and magnetic phenomena. On such occasions, as recorded by one noted telephone expert, "Sometimes it sounded as though myriads of birds flew twittering by; again, sounds like the rustling of leaves and the croaking of frogs could plainly be heard. At other times, the noise resembled the hissing of steam or the boiling of water. Even a display of the aurora borealis caused powerful currents in the telephone.

"At one time, about 1882, during the prevalence of sun spots, and after the appearance of a comet, the auroral current became so strong on a line from Boston to Brockton as to operate a miniature arc light which was improvised out of a pair of lead pencil carbons and connected into the line. Some of these disturbances have been more or less satisfactorily accounted for by assuming differences of potential at the two ends of the line; and by the passage of electrified bodies of air or clouds."

But sounds still appear in the telephone, due to causes so elusive that we can only surmise the exact nature of these extraordinary manifestations. One of the most interesting experiments of the laboratory is to place an ordinary bare copper wire across the terminals of a very delicate galvanometer. Grasping the wire in the center by the hand, or resting the finger tips upon one end of the wire, where it joins the binding post of the instrument, will be quite sufficient to cause a definite deflection of the needle. If a spot of light is reflected from the minute mirror attached to this instrument to a scale, such as is ordinarily used in conjunction with it, the spot of light will be swept quivering off the scale when the hand or fingers touch as described. Such a phenomenon is not uncommon in laboratory experiments.

This manifestation is entirely due to the creation of exceedingly weak currents, originating through the difference in temperature, between the part of the wire touched by the hand and the rest. In other words, an almost imperceptible difference in heat between one part of the wire and another, a difference that could only be detected in this electrical manner, sends a current through the galvanometer. In the case of a long telephone circuit, exposed to constant variations of temperature, these thermo electric currents are frequently traveling back and forth.

They can be readily imagined, on this basis, to cause disturbances, which with difficulty yield to any other explanation, except, perhaps, in some instances, those commonly accepted, and too well known to require further reiteration.

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THE TELEPHONE IN THE COURTS

CONDUCTED BY A. H. McMILLAN.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

DAMAGE BY LIGHTNING STROKE.

Please advise in your journal if we are liable for damages in the following case. We had left a pair of wires on a house open at house end but grounded at cable pole through the arresters as usual. Everything was out of the house except the outside wire, which stopped on two knobs at porch. One wire was burnt off a knob. A hole was made through the wood just above the knob. Shingles were knocked off the house above and back of the wires. A hole was torn in the side of the house opposite to wires and about four feet away. Plaster and furniture in the front room were ruined. There was a hole in the porch roof just above the wires. Are the chances that the wires carried in the lightning or got it coming out? Are we liable? Party had not notified us to remove the wires. Thanking you in advance, we are, A. T. Co.

WE think the chances are that the wires got the lightning coming out. The hole in the porch roof just above the wires and the shingles being knocked off above and back of the wires would indicate that fact. We do not think, however, that it is material in the case whether the lightning came in or went out of the wires. We do not believe your company would be liable in either case. In the case of Phoenix Light and Fuel Company v. Bennett (Ariz.), 63 L. R. A., 219, the court held the essential error in the case to be the submission to the jury of any question as to the defendant's liability for the failure to insulate its wires entering the plaintiff's house against lightning. Where a person proceeding in a lawful business exercises reasonable care the law does not make him an insurer against the negligence of his actions which reasonable care and foresight could not have prevented. The law justly ascribes such consequences to inevitable misfortune or to the "act of God" and leaves the harm resulting from them to be borne by him upon whom it falls. Defendant's duty did not extend so far as to require the insulation of these wires in a manner to protect against injurious consequences of a lightning stroke where the evidence showed that it was not practicable to insulate them against lightning.

PRIVATE COMPANY NOT ENTITLED TO USE PUBLIC PROPERTY.

IN the suit of the Co-operative Company of Detroit, Mich., for an injunction to restrain the Public Lighting Commission from preventing the use of its poles and conduits by the telephone company, Judge Hosmer has rendered a decision denying the company's claim to the right to use the public lighting commission poles and conduits and other public property and therefore releasing the company from its assumed obligation of giving $48 business and $24 residence rates and submitting to inspection of books and triennial revision of rates by the common council.

The court having first found that Section 10 of the Co-operative ordinance, under which the company claimed the right to use the lighting commission poles and conduits for its wires and any other available city property, as for instance the city hall attic for a central station, was void, went on to say that naturally and logically all the sections which rested upon Section 10, and in consideration thereof, were wiped out. These sections are Nos. 5, 6, 11, 12, 13, 14, 15, 16 and 17. This leaves the company in the same position as any other telephone company, with power to do business under the State laws, subject to local police regulation, with its own plant and at the rates it may establish and the public consent to pay.

The court held that there was a distinction only in degree and not in principle between municipal operation of street railroads and telephones and that therefore under the street railroad commission case (Attorney General ex rel. Barbour vs. Commission, 120 Mich.) any ordinance which provided for turning over electric light conduits to a private corporation and the construction of conduits and poles for that purpose was void as being a partial operation and also as using public money for private purposes; that no injunction would therefore lie against the lighting commission, but that inasmuch as the acceptance of all the onerous provisions of the ordinance on part of company had been in consideration of Section 10, all sections except those wherein the council exercised police power were void.

Judge Hosmer held that the control of the public lighting plant and all that pertained to it was in the hands of the Public Lighting Commission and that the common council had no more than the general police authority of regulation over the police and conduits.

CONSTRUCTION MUST BE SUFFICIENT TO STAND ORDINARY STORM.

WHERE an electric lineman was injured by the negligence of a telephone company in setting a guy pole the company was not relieved from liability because of the fact that the defectiveness of the construction only manifested itself after a severe but unprecedented storm, a telephone company being bound to make its construction sufficient to stand storms of ordinary or normal severity. So held the Kansas City Court of Appeals in a recently decided case. It also decided that it was no defense that some other person than the telephone company had negligently wrapped the ends of broken electric primary wires, which had parted as a result of the company's negligence, and thereby facilitated the forming of a short circuit on the pole on which plaintiff was working. The court also ruled that the lineman was not guilty of contributory negligence in failing to test an electric light wire or in failing to wear rubber gloves, it appearing that there was no danger in handling live wires when the body was not in a position to connect them with other charged wires or with the ground.

Smith v. Mo. & Kansas Telephone Co., 87 S. W. 71.

HEIGHT OF WIRES ON RAILROAD CROSSINGS.

What is the legal height of wires over railway crossings? G. N.

THE telephone wires must be suspended so as not to interfere with the operation of the railroad. They should be strung at such a height as to permit the passage of trains underneath and not to endanger lives of employes on such trains. Railway Company v. European Electric Printing Telegraph Company, 9 Exch., 363; Allen's Teleg. Gas., 8. The railroad company has the right to pass a train of cars underneath with a brakeman or other employe standing upon the roof, and may require the wires to be so high that they will not touch the train nor the man standing erect on top of the cars. Southwestern Telegraph and Telephone Company, 27 S. W., 38. This is true of the passage of cars of ordinary height; the telephone company cannot be required to string its wires at such a height as to permit the passage of unusually high cars with men on top of them. Gross v. Southern Chicago City Railway Company, 73 Ill. App., 217. What the actual distance should be we cannot determine without having given the ordinary height of engines and cars upon the particular railroad. See also Joyce on Electric Law, Sec. 419.

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IN THE OPERATING FIELD

MEETING OF DISTRICT NO. 3 MISSOURI INDEPENDENT ASSOCIATION.

THE third district of the Missouri Independent Telephone Association was held at Moberly, Mo., on September 22d. This district comprises thirteen counties in the central part of the State and was formerly known as the North Missouri association. Over thirty managers and operators were present and the meeting was a success from every standpoint. Houck McHenry, of Jefferson City, held the chair. Reports from all the exchanges showed very prosperous conditions. At the meeting of the Fourth district held at Quincy, Ill., on Sept. 15th, arrangements were made for new long distance toll lines to connect with the Independent system throughout Illinois. Meetings of other districts were held at Chilicothe, Mo., on the 27th, and St. Joe on the 29th.

NORTHEASTERN IOWA ASSOCIATION HOLDS MEETING.

REPRESENTATIVES of twenty-five Independent telephone companies forming the Northeastern Iowa Independent association held a regular semi-annual meeting at Waterloo, Ia., on September 15th. There were present fifty prominent operators and managers. Amongst other matters discussed was the question of adequate toll lines. A committee composed of Charles H. Deering, of Boone, and S. S. Lichty, of Waterloo, was appointed to district the State and report upon toll conditions. Victor H. Stevens, of Dubuque, who was president of the association, resigned, and A. T. Averill, of Cedar Rapids, was appointed in his place. Amongst others present were the following: O. F. Blasier, E. A. Hurmence, A. T. Whittle, A. A. Broadle, E. M. Gratopp, C. W. Ayres, W. J. Stanton, C. M. Hurd, E. F. Newberry, C. S. Colburn, C. A. Peterson, H. A. Douglas, W. G. Bowe, A. T. Averill, S. S. Lichty, D. E. Mann, M. C. Young, E. M. Haradon, T. E. Outing, Chas. C. Deering, W. J. Thill, E. H. Martin, S. O. Smalling, W. V. Shipley, R. W. Walker, G. E. Wagner and C. A. Hollis. The total number of telephones represented was 19,496.

MANITOBA IN FAVOR OF LEGISLATIVE ACTION RESPECTING TELEPHONES.

THE municipalities of Manitoba are now signing for presentation to the Legislature petitions asking that body to take over and operate all the telephone systems in the province. Neepawa is taking the lead, and cites its own experience as an argument in favor of public ownership, since it is able to supply telephones at $20 per year for business houses and half this rate for residences, against the $50 and $25 charged by the Bell Company, and that at this small price the municipal service of Neepawa shows a profit.

At its last session the Manitoba Legislature postponed action on certain applications for charters for telephone companies on the recommendation of the private bills committees, the report of which, after referring to the applications, continued: "After very careful and full consideration of the principle involved for the incorporation of these companies, the committee has agreed to report that in its opinion a better solution of the matters complained of, and which the present bills propose to remedy, viz.: correcting the abuses of monopoly, would be for the government during recess to inquire into the whole matter of the telephone service.

At the present time Charles Webster, Colonel T. A. Potter and J. B. Bowles, of Chicago, are in Winnipeg making an effort to secure a franchise for a telephone system which they wish to install, to compete with the Bell lines. Whether the franchise will be granted them, or the government build lines of its own will not be decided until Parliament is called together again. The local Conservative party is very much in favor of government and municipal ownership, so it is more than likely that within the next two years there will be a formidable rival in the field to compete against the present prohibitive charges.

Incidentally a report made shows that Winnipeg has one telephone for every thirteen of population, and this is claimed to be the highest average in the Dominion.

MEMBERS OF SOUTHERN INDIANA TELEPHONE ASSOCIATION JOIN STATE ORGANIZATION.

A MEETING of the Southern Indiana Telephone Association was held pursuant to call of its president, C. D. Knoefel, in the city of New Albany, Indiana, on Monday, September 18, 1905, at 1:30 o'clock p. m. The meeting was a very enthusiastic one, and visitors from various parts of the State representing the State Independent Telephone Association of Indiana were present: Messrs. George W. Beers, of Ft. Wayne; C. B. Norton, of Indianapolis, and Jesse W. Eick, of Greencastle, Ind., being the State Telephone Association's representatives.

The object of the meeting, besides the transaction of other business, was for the purpose of dissolving the Southern Indiana Telephone Association, and passing resolutions requesting the members of the said association to become members of the State Association. The result was that the Southern Indiana Association was dissolved, and various of its members petitioned the State Association for membership, and were enrolled in the tenth district of the State Association, of which Mr. C. D. Knoefel is vice-president. As a fitting close to the meeting, the delegates were given a smoker and Dutch supper by the New Albany Home Telephone Company, which is a part of the Louisville Home Telephone Company, at which time numerous enjoyable after-dinner speeches were made.

Besides those mentioned above there were present: E. W. Pickhardt, Huntingburg; H. C. Rothert and Phillip Dilly, of the Dubois County Telephone Company; Allan J. Payton, Rockport; T. W. Burton, Elizabeth; George Beanblossom, Eureka Telephone Company, Corydon; Walter Hitch, Sellersburg; Col. J. D. Powers, John A. Armstrong, Charles J. Doherty, E. M. Coleman, P. S. Pogue, W. B. Fisher, W. M. Brown, Donald McDonald and others from Louisville; F. J. Beaucond, James W. Dunbar, Charles D. Kelso and numerous others from New Albany and vicinity.

HOME COMPANY OF DAYTON, OHIO, HAS EXTENSIVE CONNECTIONS.

THE Home Telephone Company, of Dayton, Ohio, is meeting with flattering success. It started operation in October, 1903, and within two years has gained a foothold in that city, from which the Bell will never be able to dislodge it. It now has 4,800 subscribers in the city and is securing new subscribers at the rate of 100 per month. It has 12 exchanges in Montgomery county, outside of Dayton, and has just completed an exchange at Centerville which has 125 subscribers in service and 50 more waiting to be connected. The company has another exchange under construction at Miamisburg. Its switchboard will be equipped for 400 lines, and will have an ultimate capacity

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OFFICIAL BULLETIN NUMBER THREE OF THE NATIONAL-INTERSTATE TELEPHONE ASSOCIATION.

General Headquarters,

708 Electric Building, Cleveland, O.

OFFICE:

The association has begun the preparation of maps showing the Independent telephone development throughout the country. These maps are being made up by states and only data which we have satisfied ourselves is absolutely reliable, is being used in their preparation. When completed they will be an accurate record of the existing Independent lines throughout the country, and will be constantly kept up to date, new lines being added as rapidly as completed and reported to us. While we have sufficient data on hand to go ahead with this work, it is not as extensive nor as specific as we desire. We therefore request that every Independent telephone company in the country send us a map of all toll lines which it operates, dividing the lines into two classes.

A: Copper lines of No. 10 gauge or heavier.

B: Copper lines of No. 12 or No. 14 gauge, and all iron lines.

Designate lines under classification "A" by very heavy lines on your map, and those under classification "B" by extremely light lines. Where lines of both classes are on the same lead, designate same by a heavy line as being under class "A."

We cannot impress too strongly upon the Independent companies the importance of giving this matter their prompt attention, so that the map maker we have engaged for this work will not be unemployed while on our payroll through lack of data. Long distance companies especially are urged to furnish maps and data regarding their through lines and connections. Our maps when completed will be invaluable to the Independent interests all over the country.

INFORMATION WANTED:

Requests for information sent to the various State associations regarding the telephone situation in the different States are not meeting with the ready response they should. State association officials, who have been asked for such information, are urged to furnish same as soon as possible, and all companies are requested to aid their State officers in gathering this data.

SUPPLY DEPARTMENT CATALOGUE:

Catalogue of the various supplies which the association is handling has been printed, and a copy is being sent to each Independent company on our mailing list. All Independent companies who have not received our catalogue are requested to write this office, when copy will be furnished upon application.

STANDARD OPERATING RULES AND REGULATIONS, STANDARD FORMS OF ACCOUNTING:

The association has had several requests during the past month for copies of the Standard Operating Rules and Regulations and Standard Forms of Accounting. We should like to hear from all who care for separate copies of either of these forms. If there is a sufficient demand the association will arrange to publish them in book form. We could furnish these at about 10 cents per copy.

Address all communications to the National Interstate Telephone Association, 708 Electric Building, Cleveland, O.

of 1,000. The Bell Company has exchanges in both Miamisburg and Centerville, but the Home is doing a thriving business nevertheless. Manager H. P. Miller, of Dayton, to whose efforts the success of the new company are largely due, has extended the company's farmers' lines on every road leading out from Dayton, so that the company is now able to connect with every farmer in Montgomery county, either through its own or connecting companies' lines.

PEOPLE'S INDEPENDENT COMPANY OF PADUCAH, KY., SOLD TO E. L. BARBOUR.

THE plant of the People's Independent Telephone Company, of Paducah, Ky., with all property of every kind, lines, exchanges, telephones and other appurtenances, has been sold to E. L. Barbour, of Wauseon, O., who is one of the stockholders in the Paducah Home Telephone Company, for $80,000.

It is understood that this sale was simply a matter of form, by which the Paducah Home Telephone Company gains control of the plant and secures a clear title.

Those present at the sale were Messrs. E. L. Barbour, of Wauseon, O.; A. L. Têtu, of Nashville; J. C. Monteith, Birmingham, Ala., and J. E. Bergen, of Nanticoke, Pa., all being stockholders or connected with the Paducah Home Telephone Company.

It is understood that the sale means that the system will be improved by the Home Company, which now has control, and will give it connections with all other Independent companies and a much wider and better service.

A STRONG INDEPENDENT ALLIANCE FORMED IN INDIANA.

A STRONG combination of Independent telephone interests was formed at Marion, Ind., Sept. 21. It consisted of the Winchester Telephone Company, the Converse Telephone Company, the Delaware and Madison Counties Telephone Company and the Home Telephone Company of Ft. Wayne. Thos. Bromley, Jr., of Muncie, was elected president, and O. L. Barger, of Converse, secretary.

Some of the best known men of the State are interested in the new combination, viz.: Jams P. Goodrich, of Winchester; W. E. Hitchcock, of Muncie; W. H. H. Quick, of Anderson; George W. Beers, of Ft. Wayne, and others.

It is the purpose of the new organization to ask for a franchise in Marion and establish a plant therein. At the present time the Central Union and the United Company's interests are under the same management, and therefore, practically one telephone system. The Converse Company has a toll line reaching Marion, and maintains a central office, but has no general franchise in the city. A new copper wire circuit is being put up between Converse and Indianapolis, and the Converse Company has established connections with Wabash, Peru, Greentown, Sims, and other cities with copper circuits.

It is generally believed that the Marion franchise will be granted, and if it is a telephone system will be established at once by the interests involved in the combination.

MISSOURI INDEPENDENT ASSOCIATION APPOINTS TRAVELING SECRETARY.

THE Executive Board of the Missouri Independent Telephone Association at a recent meeting appointed James F. Barnett as acting traveling secretary. The State was divided into nine districts, and it will be the traveling secretary's duty to organize each district.

Meetings will be held from time to time to discuss matters relative to the situation in each of the districts.

CONSOLIDATED COMPANY OF PENNSYLVANIA TO SPEND $100,000 FOR IMPROVEMENTS.

THE management of the Consolidated Telephone Companies of Pennsylvania has arranged to make many additional improvements to the Independent system in Allentown, Pa. The principal of these is a new switchboard costing $68,000. When the company was organized it was calculated that there would be 400 subscribers, but a board was installed capable of accommodating 1,200 telephones. Such, however, was the demand for the new Independent telephones that there are 2,300 subscribers in Allentown. The exchange is thus taxed to double its capacity. Some of the girls attend to as high as 250 telephones.

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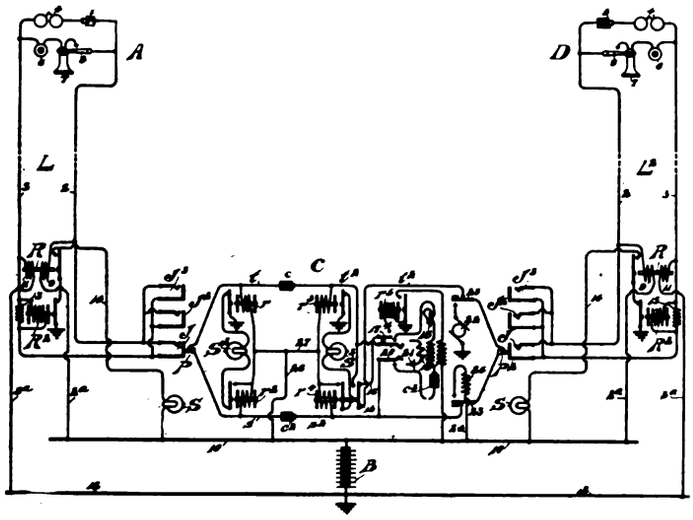
TELEPHONE PATENTS

TELEPHONE SYSTEM.

William W. Dean, of Chicago, Ill., patents (No. 794,348; dated July 11, 1905; filed September 14, 1903; serial No. 173,022, and assigned by mesne assignments to Kellogg Switchboard and Supply Co. of Chicago, Ill.) a telephone system.

This invention relates to improvements in telephone systems, particularly the type known as "two wire." In telephone systems of this class the salient feature is the provision of only two wires for each subscriber extending throughout the multiple switchboard, without, it is claimed, sacrificing any of the advantages of a common battery at the central office, a suitable busy test, and the operation in the desired manner of the line, cut off and supervisory relays.



In the sketch L and L^2 indicate subscribers' telephone lines extending in two limbs 2 and 3 from their respective sub-stations A and D to the central office C. At the sub-stations each line is provided with an ordinary polarised signaling bell 4 and a condenser 5, preferably in a permanent bridge of the line conductors, and with a transmitter 6 and receiver 7 in a second bridge, whose normal discontinuity is maintained by the switch-hook 8. At the central office each line is provided with an answering jack J, a plurality of multiple jacks, such as J^2 and J^3 in any number and a line signal S, etc. When in operation, the subscriber A, for example, desiring a connection, takes up his receiver and completes thereby the circuit. The insertion by the operator of the answering plug P into J makes the receiving of the order possible. After the conversation by subscribers the receivers are returned to their hooks, the tip supervisory relays r and r^2 in the cord circuit are de-energized, the supervisory lamps lighted to indicate termination of conversation as per patent specification.

TELEPHONE SYSTEM.

William W. Dean, of Chicago, Ill., patents (No. 796,568; dated Aug. 8, 1905; filed Oct. 27, 1902; serial No. 128,882, and assigned by mesne assignment to Kellogg Switchboard and Supply Company, of Chicago, Ill.) a telephone system.

In this invention, a combination of the following: A telephone line, a relay at the central office in each line conductor, a differential relay connected in each line conductor and appropriate telephonic devices, constitutes the means by which a common battery system actuates signals and apparatus, leaving the subscriber with only the necessary mechanical and electrical devices for completing the circuits.

ANNUNCIATOR.

Severin B. Bankson, of San Francisco, Cal., patents (No. 795,473; dated July 15, 1905; filed July 26, 1904; serial No. 218,297) an annunciator.

By means of this invention a call sent to any room will indicate whether the bell has been rung in said room. The invention is adapted to use in telephone service. The interruption of the bell circuit are led into a receiver, which the clerk can use for determining whether the guests' bell has been rung or not.

LOCK OUT TELEPHONE.

Mark P. Boone, of Peru, Ind., patents (No. 798,561; dated August 29, 1905; filed April 11, 1905; serial No. 254,934); a common battery lock-out telephone.

This invention is a device by which all parties are locked out excepting those using the line. If a current is established between two lines, a lock out magnet at the subscriber's stations becomes operative and electrically isolates the speakers.

REPEATER.

David H. Wilson patents (No. 798,720; dated Sept. 5, 1905; filed Feb. 14, 1903; renewed Feb. 11, 1905; serial No. 245,229; and assigns by mesne assignments to George W. Kretzinger, of Chicago, Ill.); a telephone repeater.

In this invention a new and improved device is claimed, whose construction consists of a core having two coils; a receiver associated with said core in addition to a transmitter; a coil on the core in circuit with the transmitter and a source of current.

In Fig. 1 two sets of instruments, A and B, are represented. The repeater is located along the line. The core C has a winding A^1, connected in circuit with the instruments at station A. Coil B^1 connects with station B. The core acts as a controlling magnet for the receiver diaphragms of D and E. A divided primary coil of two sections H and H^1 are wound upon C. By this construction if instruments at A are used, A^1 is energized, C is energized and D operates; D acts upon the transmitter F, and the current passes through sections H and H^1 of the coil. The induced current in B^1 reaches station B. The receiver E is in operation with D and I feeds both H and H^1. The receivers act upon transmitters, produce current in H and H^1 and induce current in the coil A^1 which passed out to A and reproduces sound there.

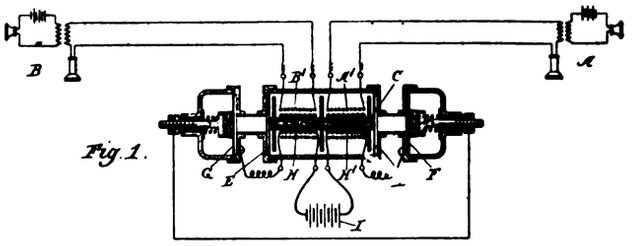


Fig. 1.

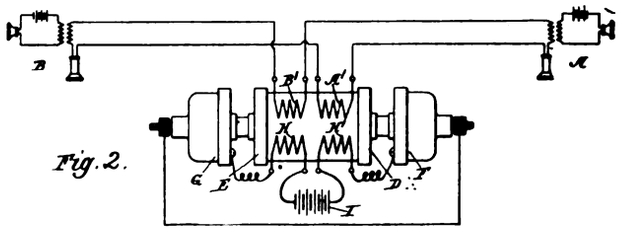


Fig. 2.

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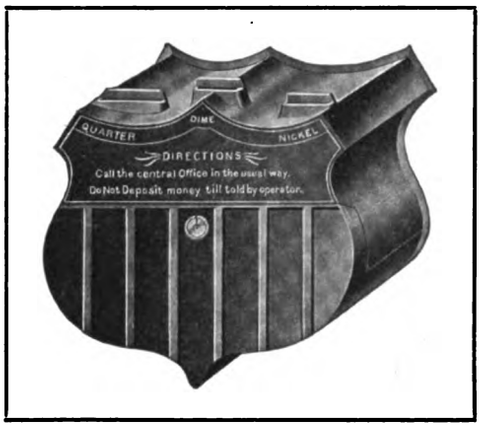
GRAY TELEPHONE PAYING PAY STATIONS



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ALWAYS WORKING.

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Geo. W. Conover,
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Chicago, Ill.

Sterling Elec. Co.,
La Fayette, Ind.

Eastern Electric Con. Co.,
Philadelphia, Pa.

YOU KNOW YOU MUST HAVE RAPID SERVICE
ACCURATE AND CLEAR SIGNALS
YOU KNOW IT MUST BE A **GRAY**

Write for Catalogue Illustrating the Pay Station That Pays. 50 Styles.

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THINK OF ME

Every time you use or buy telephone construction iron, remember I am the maker of the "BULL TONGUE" Land Anchor, and also sell everything else in telephone construction iron.

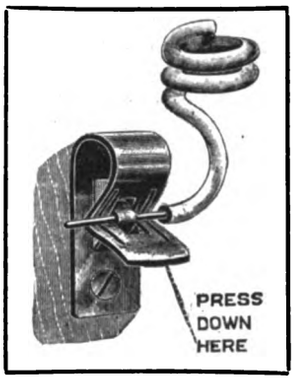
My Anchor is the best and cheapest made. It is easier and quicker to instal, and holds better than any made.

Write for my book.

I. A. BENNETT
CHICAGO
141 South Clinton Street

It Can't Jar Loose!

There's only one excuse for the **Fahnestock Binding Post.** It's better than any other kind. It's adapted for any electrical use but particularly good on batteries. You press down the spring, insert the wire and let go. The spring grasps the wire and never lets go until you want it to. It's a permanent, positive connection. You can buy your batteries equipped with this Post by specifying it.



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Fahnestock Transmitter Co.
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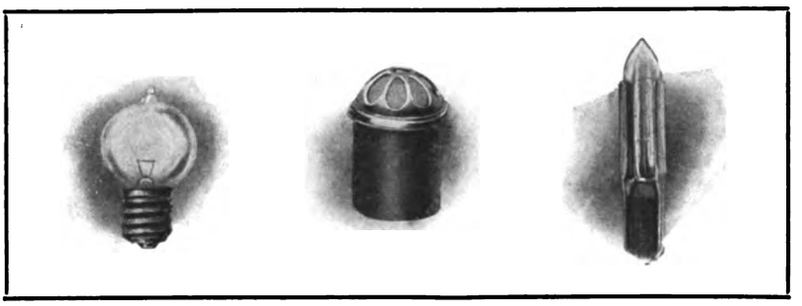
IN THE MANUFACTURING FIELD

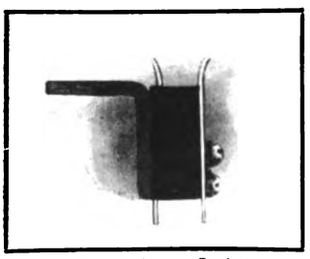
"SUCCESS LIES IN THE KNOWLEDGE OF OUR TOOLS"

ANDRAE TRANSFER EQUIPMENT.

THE express switchboard differs from the multiple type in that instead of the subscribers lines being multipled so that any operator can reach any number, transfer trunks are employed, by which a call originating at one position can be cross connected to another for its completion. The operator receiving the call is technically designated the *A* operator, and the one completing the connection the *C* operator. The plan of procedure with a transfer call is as follows: Take a call from line 136 in section one for subscriber 974 in section nine. The operator ascertaining the party desired, goes in on an order wire key, which connects her talking set with the one of the operator in section 9. The *A* operator at the same time places the other half of the cord circuit connected with jack 136 into the jack of a transfer trunk. This lights a pilot light at the *C* operator's position. The *A* operator notifies the *C* operator of the desired number in her position, and the *C* operator takes the plug at which the transfer trunk terminates and inserts it in jack 974. Moving the plug from its seal extinguishes the pilot light and indicates to the *C* operator that she has taken up the right trunk. The supervision of the connection is done by the *A* operator, and when the conversation is completed she removes the plugs from the local and transfer jacks. This causes the pilot lamp at *C* to light, notifying that operator to take down the transfer connection.



No. 2 Lamp, 4 to 45 volts. *No. 19 Prism.* *No. 10 Lamp, 4 to 45 volts.*

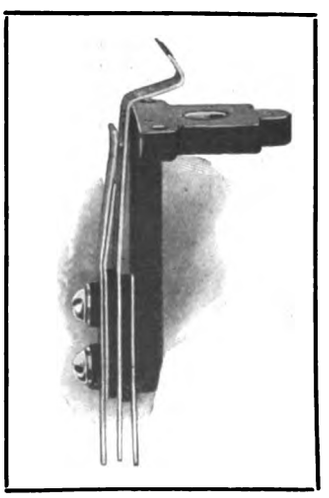


No. 18 Lamp Socket for No. 10 Lamp.

This system is known as the flashlight transfer, and is manufactured by the Julius Andrae & Son's Company, Milwaukee, Wis. The necessary material for one complete transfer circuit consists of the following: An order wire key, transfer jack, transfer cord and plug, plug seat and switch, lamp, lamp socket and prism.

The extent of the business determines the number of transfer trunks to be employed, as many as four being necessary in busy offices. The accompanying illustrations show some of the different pieces of equipment. The company will be pleased to furnish further particulars and catalogues upon request.

THE FISK-NEWHALL TELEPHONE MANUFACTURING COMPANY, Chicago, Ill., desires to draw the attention of the trade to its new trademark. It is made up from the first two letters of each partner's name, combined into the word F I - N E. The company claims this word well represents the quality of the goods it manufactures, as they are as *fine* as can be made, and not as cheap as possible. The company will be pleased to hear from parties interested in telephone material and supplies, and will quote prices upon request.

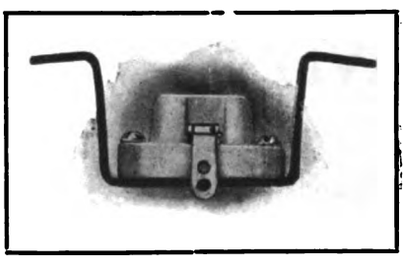


No. 7 Plug Seat Switch.

THE STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY, Rochester, N. Y., reports having closed contracts for switchboards for the following places: Aurora, for use at Peoria, Ill.; Newark, O.; Cadiz, Ky.; Bartonsville, Ky.; Donnybrook, N. D.; Sherman, Tex.; Mt. Pleasant, Ill.; Hunter, N. D.; Union, Miss.; Harris, Pa.; Des Moines, Ia.; Roann, Ind.; Tower Hill, Ill.; Milacca, Princeton, Foley, North Branch, Rush City, Mora, Forest Lake, Grandy, Lindstrom, Braham, Minn.; Olathe, Kan.; Rochester, N. Y.; Truro, Ia.; Kalama, Wash.

THE FRANKEL DISPLAY FIXTURE COMPANY, 718 Broadway, N. Y., is distributing blotters which advertise its electric testing clip. This clip is designed to make rapid tests on insulated wires without necessitating the skinning of the wire. On the front of the blotter the following remark appears: "Blot out unnecessary expense by using Frankel's Electric Testing Clip." These blotters will be sent to all parties requesting them.

THE NORTH ELECTRIC COMPANY, Cleveland, Ohio, desires to call the attention of the trade to its metal cabinet common battery instrument. The case is heavy steel finished with a hard black enamel. The instrument is self-contained, compact and indestructible. All the terminals are concealed, and yet so placed as to be readily examined when the front is opened. The wires are well insulated, formed into a cable and boiled in beeswax to secure absolute protection against the entrance of moisture. The equipment consists of the following standard parts: North's new solid back transmitter, North's permanently adjusted receiver, North's new type ringer with knife edge armature, and North's vertical lever, adjustable tension, switch hook. The North Company will be pleased to hear from parties interested and give further information upon request.



No. 21 Lamp Socket for No. 2 Lamp.

THE CENTRAL TELEPHONE AND ELECTRIC COMPANY, of St. Louis, Mo., is making a specialty of its Leader Junior telephones. This instrument is similar in outward design to a common battery instrument. The generator is mounted inside the cabinet under the writing shelf, and the batteries are installed in a compartment below. This instrument is equipped with either four or five bar generators.

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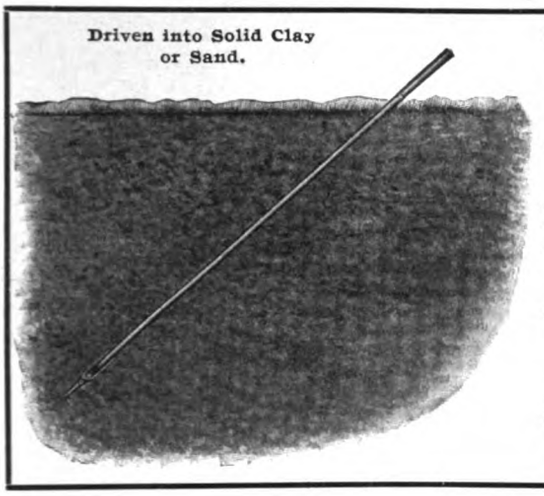

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Drive and Twist

Made with a 6-foot ⅞-inch solid steel shaft, formed into a ring at the top.

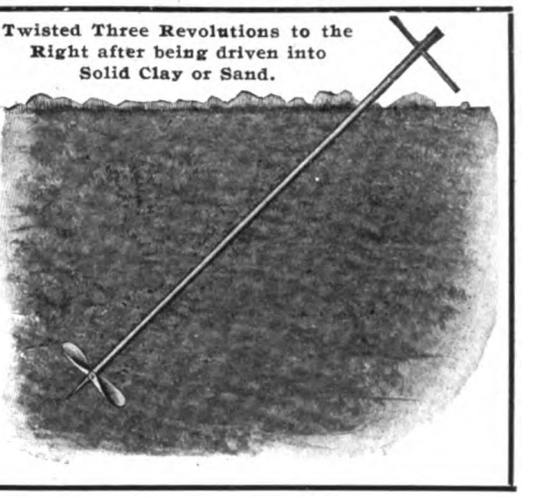
Installed in 60 Seconds.

The Strongest Anchor Made.

The Cheapest Anchor Installed.

Write for circulars and our Souvenir Model Anchor.

THE D. & T. ANCHOR CO.
La Crosse, Wis.



FOR SALE

Advertisements under this head, $1.00 for 25 words or less for each insertion. Prepaid.

FOR SALE, CHEAP—600 pairs Kaisling self-soldering protectors. Also one 300 pair and one 500 pair American main distributing frame, used less than two months. Will sell separately or together. Address Virden Telephone Exchange, Virden, Ill., or Girard Telephone Exchange, Girard, Ill. 420

FOR SALE—One 100 line Western Telephone Construction Company's express switchboard, complete in all respects, with 100 series combined jacks and drops installed. This board has been in service 1½ years, giving the best of results, and has been displaced owing to the growth of the exchange. The board has recently been thoroughly overhauled and is in fine condition, and will sell at a bargain. Address, Wesco Supply Co., St. Louis. 472

SUPPLIES WANTED

SUPPLIES WANTED.

WANTED—Two 100-line Kellogg Switchboards, two 150-line Kellogg Switchboards, two 100-line Monarch Switchboards, three 100-line American Switchboards. Address Box 465, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 465

WANTED

Advertisements under this head 25 cents for 25 words or less for each insertion. Set in bold face type $1.00 per insertion for 25 words or less.

WANTED—Agents of ability for every State to handle line of first-class telephones, supplies and apparatus. Write, giving full particulars, age, salary expected, etc., to Box No. 439, care of THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York. 439

WANTED—As traveling inspectors, 4 men of good appearance and address who have had general telephone experience. Application must be made in your own handwriting, giving history of your past experience and ample references. State salary expected. Address Geo. J. Yundt, Engineer, Southern Bell Telephone and Telegraph Company, Atlanta, Ga. 467

WANTED—Position by married man, 33 years old, 12 years' experience. Competent to take charge of construction or maintenance. Can test for cable faults and splice cable. Address Box 468, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 468

WANTED—Salesman who is capable of selling telephones, switchboards and materials, to travel in Missouri and Kansas. Address, Box 473, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 473

Perfect Transmission

Are you looking for it?
Do you think that you have found it?
We can prove to you that the "Eastern" transmitter is superior to all others.

HOW?

By actual comparative tests.
Others have tried them and use no other.
Why not you?

EASTERN TELEPHONE MFG. CO.
WEST CHESTER, PA.

WANTED—Continued

WANTED—An A 1 man of good appearance who thoroughly understands the bookkeeping, soliciting, collecting and the adjusting departments of the telephone business. Southern city; 2,500 telephones and hard work—especially on collecting and adjusting. Married man preferred. Salary $1,200 per year to start. Proven ability can command more. Address, Box 471, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 471

OUR FREE BOOKLET contains the key to information regarding our high grade positions, numbering over 3,000, for technical, clerical and commercial men. The technical and business worlds are constantly demanding abler and better men than ever before and realize how difficult it is to find the right sort. If you are a high grade man, now is your opportunity. Offices in twelve cities. HAPGOOD'S, Suite 511, 309 Broadway, New York City. 464

WANTED—Position as day or night operator in small exchange. Several years' experience. Best of references. Am confined to wheel chair on account of paralysis. Address Yost Miller, 68 Central avenue, Noblesville, Ind. 462

WANTED—Position as manager or superintendent by good, all around telephonist. Seven years' experience. Hustler, strictly temperate, familiar with manual and Strowger automatic system. Age 26, married. Address Box 474, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 474

WANTED—Position as manager or wire chief. Eight years' experience installing, engineering, maintaining and managing telephone plants. Married. Best of references furnished. West preferred. Address Box 475, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 475

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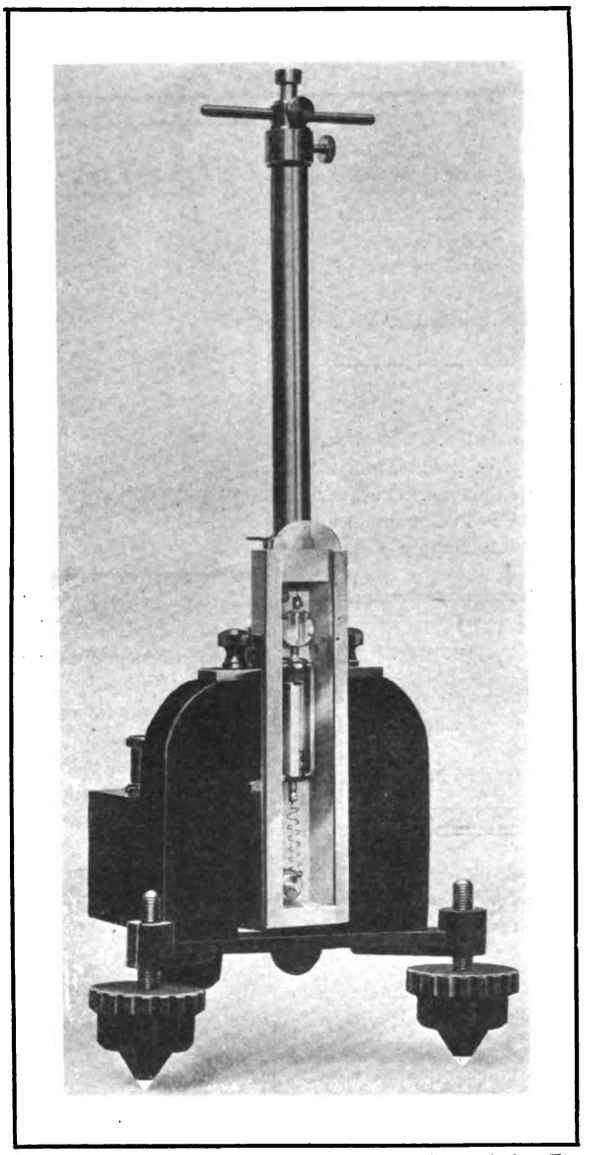
IN THE MANUFACTURING FIELD

A NEW TYPE GALVANOMETER.

WHEN accurate electrical measurements are desired it is customary to use a reflecting galvanometer of the D'Arsonval type. This instrument is well known in its general form and requires no further description. In its details, however, each manufacturer has incorporated ideas which have for their objects improvements in design and sensibility.

The Leeds & Northrup Company, of Philadelphia, has recently placed upon the market a new form of high sensibility D'Arsonval galvanometer for cable testing, shown in the accompanying illustration.



New type D'Arsonval Galvanometer. Manufactured by The Leeds & Northrup Co., Philadelphia, Pa.

In design it is a radical departure from the old style laminated magnet with suspension tube, that allowed but small clearance for the coil, and did not permit the suspended system to be visible.

This instrument possesses the following prominent features:

The removal of the tube containing the moving system is readily effected by the loosening of two thumb screws. If any adjustments are to be made, such as the insertion of a new suspension, the tube can be removed from the magnet and laid horizontally on a table, which is often of great convenience. The tube has at its back a simple device for clamping the coil, so that the galvanometer and tube may be moved about. The coil suspension has a spring device in the top of the tube, so that the suspension is not easily broken. The entire system is visible by means of the open glass front given to the tube. A small index point on the coil shows when the galvanometer is exactly level, and the coil is swinging centrally in the field.

The coil is of the rectangular type, similar to the Leeds & Northrup type H coil, but is made smaller, so that the system will be lighter and give a greater sensibility with a given period of swing.

To provide the highest possible insulation the entire galvanometer is insulated from earth by means of three hard rubber leveling screws terminating in steel points. The bottom of the leveling screws have deep grooves turned in them, thus making a "petticoat" insulation. This instrument is finished in an exceptionally fine manner and is designed to offer every advantage in rapidity of manipulation. Parties interested are requested to write for further particulars.

THE UNIVERSAL CABLE GRIP COMPANY, Syracuse, N. Y., has been incorporated with a capital of $3,000 to manufacture cable grips and machinery. This firm has an entirely new idea in the way of a grip for pulling in cable which will not slip nor injure the cable in any way. The directors are G. W. Wood and R. M. Gillespie, of Syracuse, and P. J. Martin, of Solvay.

NATIONAL INTERSTATE ASSOCIATION ISSUES CATALOGUE.

THE National Interstate Telephone Association has issued a catalogue which lists material handled by its supply department. As a prefix the catalogue states that the object of handling these supplies is: First—To assist in the adoption of the association emblem. Second—To make its adoption possible at a minimum cost, and third, to provide funds to assist in carrying on the work of the association. The signs for sale are furnished in enamelled iron or transparencies for window use. These are quoted in lots to meet all requirements at very reasonable figures. Besides signs the following supplies are listed and priced: Directory covers, letter heads, second sheets, copy paper, envelopes, business cards and electros of the emblem. All communications should be addressed to the supply department, 708 Electric Building, Cleveland, O.

THE INTERNATIONAL TELEPHONE MANUFACTURING COMPANY reports an increasing demand for its various types of central energy and magneto switchboard equipments, The following sales have been made recently: La Plata, Clarksville, Eolia, Paris, Aux Vasse, Cyrene, Carrington, Ashley and an addition to the board already installed at Bowling Green, all in Missouri, and Morton, Williamsville, Orion, Hoopeston, Washburn, Stanford, Stonington, Henry and Colchester, all in Illinois, and a number of additional equipments throughout the United States and Canada.

THE F. BISSELL COMPANY, Toledo, Ohio, is placing on the market a new Security distributing panel. The contacts are riveted to a hard rubber block and are countersunk into it, the holes being filled with an insulating compound. The base of these panels is kiln dried oak, heavily coated with an elastic insulating varnish. This foundation, it will be noticed, has a very high insulation; this together with the use of a hard rubber stop eliminates all possibility of crosses or shunts due to moisture entering into the supports. The company will be pleased to furnish further particulars upon request.

THE F. BISSELL TELEPHONE COMPANY, TOLEDO, O., has adopted a new trademark. It consists of an oval design, in the center of which is a representation of a bullfrog; around the outer edge is a band, upon which the name of the company and trademark appears. As this firm is well known through its bullfrog specialties, the trademark is exceedingly appropriate and will be readily recognized.

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SUMTER

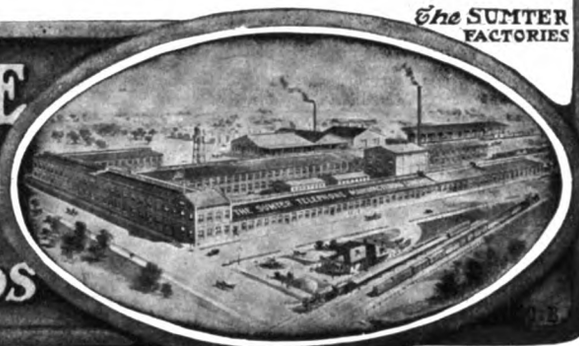
SOLD ON QUALITY—NOT ON PRICE

SOME PEOPLE THINK

that because Sumter apparatus is so much better than others its initial cost is too great for them.

Such is not the case. Large production has enabled us to reduce the individual profit on each telephone to a minimum. It should always be borne in mind that it is the maintenance expenses of a telephone line that reduce revenue and fathers cuss words. "SUMTER QUALITY" is more than simply a phrase. You had better get some and see.

The SUMTER FACTORIES



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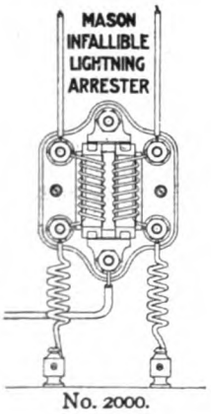

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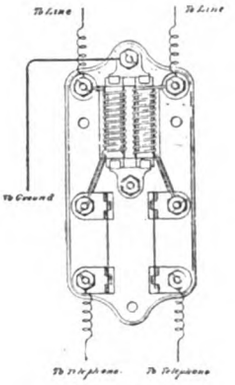

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Operator's Revolving Chair

No. 78 M. Stool.

Steel Foot Rest—Seat and Back Readily Adjustable to Occupant—Height of Chair Easily Regulated.

Frame work made of Bessemer Steel, 3/8 (three-eighths) inch Rods twisted and interwoven. Wood work, oak, birch or mahogany finish, as preferred. Metal work heavily plated, Japanese copper finish.

The Most Comfortable High Chair Made

The Most Attractive and Convenient

INDESTRUCTIBLE—Nothing to get Broken

24 in. high 28 in. high

Warranted for 10 years. *Send for Complete Catalogue and Prices.*

The **A. H. Andrews Co.**

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FINANCIAL.

NEW BRITAIN, CONN.—The directors of the Farmington Valley Telephone Company, New Britain, Conn., have declared a semi-annual dividend of 3 per cent., payable October 1.

AURORA, ILL.—At the annual meeting of the Interstate Telephone & Telegraph Company, held on the 11th inst., the seventeenth regular quarterly dividend of 1 per cent. was declared on the entire capital stock of the Interstate Company. The report for the fiscal year ending June 30 also showed an increase of nearly $20,000 in the surplus over and above fixed charges, including interest and dividends, which was considered by the full board to be very satisfactory.

ST. PAUL, MINN.—The Norman County Telephone Company filed an amendment to its charter raising its capital stock to $12,500.

AUBURN, NEB.—The Auburn Telephone Company will expend at once $10,000 in improving its system.

HUDSON, N. Y.—The directors of the Columbia Telephone Company of Hudson, N. Y., have declared the fourth quarterly dividend of 1¼ per cent., payable October 1.

MADRID, N. Y.—The Madrid Telephone Company has increased its capital stock from $10,000 to $15,000.

HUNTER, N. D.—The Hunter Telephone Company, Hunter, N. D., has increased its capital stock from $5,000 to $15,000.

FRANCHISES.

YEOMAN, IND.—The Yeoman Telephone Company has applied for a franchise in Monticello.

CHILLICOTHE, O.—The People's Telephone Company has been granted a twenty year franchise.

PERTH AMBOY, N. J.—The Hudson & Middlesex Telephone Company has been granted a twenty year franchise in this city.

PIEDMONT, N. C.—The Piedmont Telephone Company has been granted a franchise at Lexington.

ABERDEEN, S. D.—The Groton-Ferney Mutual Telephone Company has applied to the City Council for a franchise.

COMBINATIONS.

ARDMORE, I. T.—The Sulphur telephone system has been sold by C. J. Webster and J. D. Kirby to W. N. Hayes, of Norman, O. T., and J. F. Rumley, of Chicago. The new owners have already taken charge and will make extensive improvements.

FRANKLIN, IND.—William Mullendore and Messrs. Frank and Victor Smith have disposed of their holdings in the Franklin Telephone Company to Louis Hollweg, president of the Independent Telephone Company, of Indiana. Ferd Strickler, one of the stockholders in the Franklin Company, retains his interest and will be placed in charge of the local plant.

PADUCAH, KY.—The People's Independent Telephone Company has been sold to the Paducah Home Telephone Company for $80,000. The new concern is said to have large capital and the local exchange will have connection with many Independent companies in the country.

FOLEY, MINN.—The Twin City Telephone Company has purchased the Maple Leaf Telephone Company of this city, and it is reported that a line will be run from Santiago, Sherburne County, to connect with the local exchange. The purchase is taken as an evidence that the company contemplates invading territory tributary to St. Cloud.

FARMINGTON, MO.—T. P. Pigg and associates have bought the Farmington Telephone Company.

BUFFALO, N. Y.—The Consolidated Telephone Company, of Buffalo, which controls the Frontier Telephone Company, has purchased the Elma Telephone Company, of Elma, N. Y., and the Marilla Telephone Company, of Marilla.

LOWVILLE, N. Y.—The Black River Telephone Company, of Lowville, has purchased the Citizens' Telephone Company, of Black River.

ELECTIONS.

AURORA, ILL.—The Interstate Telephone & Telegraph Company has elected the following officers: President, H. ... Evans; vice-president, V. A. Watkins; treasurer, J. F. Harrar; secretary and general manager, E. R. Conklin.

HARLAN, IA.—The Shelby County Telephone Company has elected the following officers: President, Frank Faltonsen, Polk township; vice-president, G. W. Cullison, Harlan; secretary, Andrew Raasch, Polk township; treasurer, George McMullen, Irwin.

LITCHFIELD, ILL.—The stockholders of the Montgomery County Telephone Company have elected the following directors: A. G. Butler, Dr. M. L. Moyer, G. W. Rainey, A. K. Vandiver, August Kellenburger, H. H. Zimmerman, C. H. Poland, George D. Taylor and Robert Barnard. C. H. Poland was chosen president, H. H. Zimmerman, vice-president, and Robert Barnard, secretary and treasurer.

GRAND LEDGE, MINN.—The Grand Ledge Telephone Company at its annual meeting elected the following officers: President, Clark Smith; vice-president, D. Shadduck; secretary, G. M. Every; treasurer, D. Shadduck; The board of directors is composed of Clark Smith, D. Shadduck, D. G. Kennedy, G. M. Every and Joseph Otto.

TARKIO, MO.—The Atchison County Mutual Telephone Company has elected the following officers: D. H. Kemerling, president; J. L. Beck, vice-president; George H. Shandy, secretary, and R. M. Stevenson, treasurer.

APPLETON, WIS.—The consolidation of the Valley Telephone & Telegraph Company of Green Bay and the Fox River Valley Telephone Company of Appleton, has been completed, with the following list of officers: President, J. S. Van Nortwick, Appleton; vice-president, W. E. Fairfield, Green Bay; secretary, J. P. Hoeffel, Green Bay; treasurer, W. F. Hayes, Chicago; director, L. C. Schilling, W. F. Fairfield, Green Bay; C. F. Spaulding, W. F. Hayes, Chicago; W. F. Davis, Milwaukee; J. S. Van Nortwick, J. M. Baer, J. McNaughton, D. E. Reese, Appleton. The company will start work on the main toll line between Green Bay and Appleton as soon as the necessary arrangements can be made.

NEW COMPANIES.

ADIN, CAL.—A number of farmers of Big Valley have organized a telephone company for the purpose of running a line out into the valley. Contracts for the erection of twelve miles have been let. The system will be connected with Adin.

COLORADO CITY, COL.—The Home Telephone Company has been incorporated with a capital stock of $50,000. Incorporators—R. M. Handy, C. E. Delph and others.

TOWER HILL, ILL.—A telephone company has been formed at Tower Hill. President, E. G. Foster; vice-president, A. C. Jackson; secretary and treasurer, J. C. Pitzer.

NOWATA, I. T.—The Delaware Telephone Company has been incorporated with a capital stock of $25,000.

GREENFIELD, IND.—The Home Telephone Company of Hancock County has been incorporated. Incorporators—A. E. Reevey, M. E. Dobbins and S. A. Wray.

SHIRLEY, IND.—The Citizens' Telephone Company has been incorporated. W. B. Thompson, president, and H. Griffith, secretary.

CINCINNATI, O.—The Farmers' & Merchants' Mutual Telephone Company, Cincinnati, has been incorporated with a capital stock of $10,000. Incorporators—G. W. McKeehan and others.

NEWS—WANTED

THE matter contained upon the Message and Operating Field pages of this paper is contributed largely by our special correspondents. We believe, however, that there are many valuable items of telephonic interest which are never brought to the attention of the public. There is no reason why this condition should exist, and the Editor, therefore, invites all telephone companies, and the officials of such companies, to furnish any information that they can consistently make public relative to financial statistics, new construction, elections, franchises and personal items.

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Wholesalers of **Michigan White Cedar** **POLES** *of* **QUALITY**

Five Yards ***Prompt Shipments***

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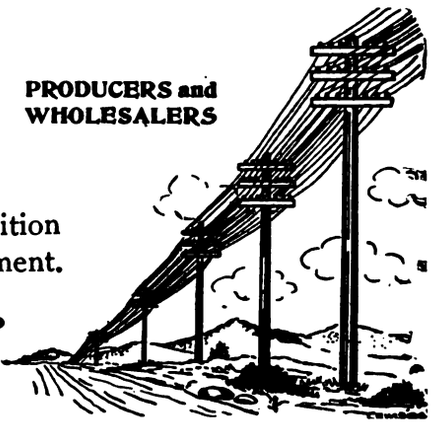

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Are the BEST.

Because our location enables us to
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THE WEEK'S MESSAGES

ELMIRA, O.—The Northwestern Mutual Telephone Company has been incorporated with a capital stock of $10,000. Incorporators—J. H. Ferrel, J. F. Reeves and others.

FLORA, O.—The Home Telephone Company of Flora has been incorporated with a capital stock of $5,000. Incorporators—H. E. Soeshe, H. Studebaker and others.

McVEYTOWN, PA.—A co-operative telephone line is being built by thirty-five farmers of Bratton township, Mifflin County, Pa., joining with McVeytown.

TROY, PA.—The Troy & Canton Telephone & Telegraph Company has been chartered with a capital of $5,000 to carry on business in Bradford County. I. S. Reddington, of Troy, is the treasurer.

BALDWIN, WIS.—The Rush River & Eau Galle Telephone Company has been incorporated with a capital stock of $3,520. Incorporators—Lewis Crogen, A. T. Sabby and others.

PERSONAL.

Under this heading we publish news respecting the appointment of managers of telephone companies and other officials of such companies. As we are anxious to increase the space devoted to this department, we would ask all parties who have made changes, or who contemplate making changes, to communicate with us.

ARTHUR AHREND has been appointed service inspector for the Central Union Telephone Company.

MARK HAMMETT has been appointed manager for the Pine Bluff Telephone Company, with headquarters at Pine Bluff, Ark.

L. M. HAWKINS has been appointed manager for the Southern Bell Telephone Company at Birmingham, Ala.

CHARLES C. LEWIS has been appointed manager of the Fremont, Ind., Central Union Telephone exchange.

E. V. STOTTS has been appointed manager for the Consolidated Telephone Company, with headquarters at Phœnix, Tex.

MISCELLANEOUS.

DAUPHIN, MANITOBA, CAN.—By a vote of 100 to 23 the ratepayers decided in favor of municipal telephone service, which will be installed during the coming winter.

MITCHELLVILLE, IA.—The Mitchellville Telephone Company has severed toll connections with the Iowa Telephone Company and connected with the Mutual Independent Company at Des Moines. The company has exchanges at Altoona, Mitchellville, Prairie City and Runnells.

FAYETTE, MO.—The Howard County Telephone Company will issue a new directory, which will show a great increase in its list of subscribers.

KINGSTON, N. Y.—The new Citizens' Standard Telephone Company is rapidly increasing the number of its subscribers and is behind on orders for new installations.

MEDINA, O.—The exchange of the Medina Home Telephone Company will be moved to larger quarters on account of increased business.

PALESTINE, TEX.—The Palestine Telephone Company has extended its free toll service to a number of rural systems in this vicinity.

RAWLINS, WYO.—It is reported here that a private telephone company is to be organized to build and operate telephone lines in Rawlins and the surrounding towns.

New Construction in the Field

MELITA, MANITOBA, CAN.—The Melita-Arthur Telephone Company will build a line to connect with West Hope and several nearby settlements.

MOOSEJAW, SASK., CAN.—The Moosejaw Telephone Company is installing a new switchboard. In a few days the long distance line being built by the company between here and Regina will be completed.

SASKATOON, SASK., CAN.—The Saskatchewan Telephone Company is installing in its new premises and is preparing to build long distance lines to several adjacent towns.

COLTON, CAL.—The Home Telephone Company has purchased ground and will erect upon it a two-story building to cost $12,000.

BURROWS, IND.—The Co-operative Telephone Companies of Burrows, Deer Creek, Rockfield and Camden are contemplating a metallic circuit trunk line connecting the various companies with Delphi.

TALMA, IND.—The Talma Telephone Company has centralized its plant and installed a new exchange at this point.

HUMBOLDT, IA.—The Rural Union Telephone Company will occupy larger quarters as soon as the changes can be made.

BOWLING GREEN, KY.—The Bowling Green Telephone Company is installing a new switchboard and making other improvements to its system.

OWINGSVILLE, KY.—The new exchange being erected here by the Home Telephone Company is rapidly nearing completion, and will be in operation by October 1.

ASHLEY, MICH.—The Union Telephone Company has just commenced the work of installing a telephone exchange at this point.

GRANITE FALLS, MINN.—The Granite Falls Telephone Company is building new lines and extending its system preparatory to installing a new exchange.

ROCHESTER, MINN.—The Rochester Telephone Company is installing 500 new telephones.

SAVANNAH, MO.—The Delay telephone system at this point has been remodelled and new equipment installed.

LOGAN, N. Y.—The Hector Ridge Telephone Company is building a line from this point to Reynoldsville.

WHITEHALL, N. Y.—The Cooperant Telephone Company has rented new offices. A switchboard will be installed and other improvements are under way.

TOWER CITY, N. D.—The Tower City Telephone Company is enlarging its system. It now has over 100 subscribers and the list is increasing.

QUAKERTOWN, PA.—The Franklin Telephone Company has begun the erection of a trunk line to Flemington.

BANDERA, TEX.—The Bandy Telephone Company has been organized and will build a line from San Antonio to Bandera.

SHERMAN, TEX.—The North Texas Telephone Company is to construct a line to Gainesville.

ST. JOHNSBURY, VT.—The Citizens' Telephone Company is building new trunk lines to Cabot, Marshfield, Lyndonville and Barton.

CAPRON, VA.—The Nansemond Telephone Company has extended its lines to Capron, Pope, Worrell and Drewryville, Va. This is a local enterprise, which is continually adding some improvements, and whose service is excellent.

GALESVILLE, WIS.—The Stevenson Telephone Company has started work upon its system. Twelve miles of line will be built opening up a new territory in La Crosse County to Galesville.

GREEN BAY, WIS.—The Valley Telephone Company will build new toll lines between Appleton, Green Bay and Kaukauna, and also erect the toll lines to Neenah and Menasha.

WAUPAEA, WIS.—The Citizens' Telephone Company is installing a new switchboard and making a number of improvements to its system.

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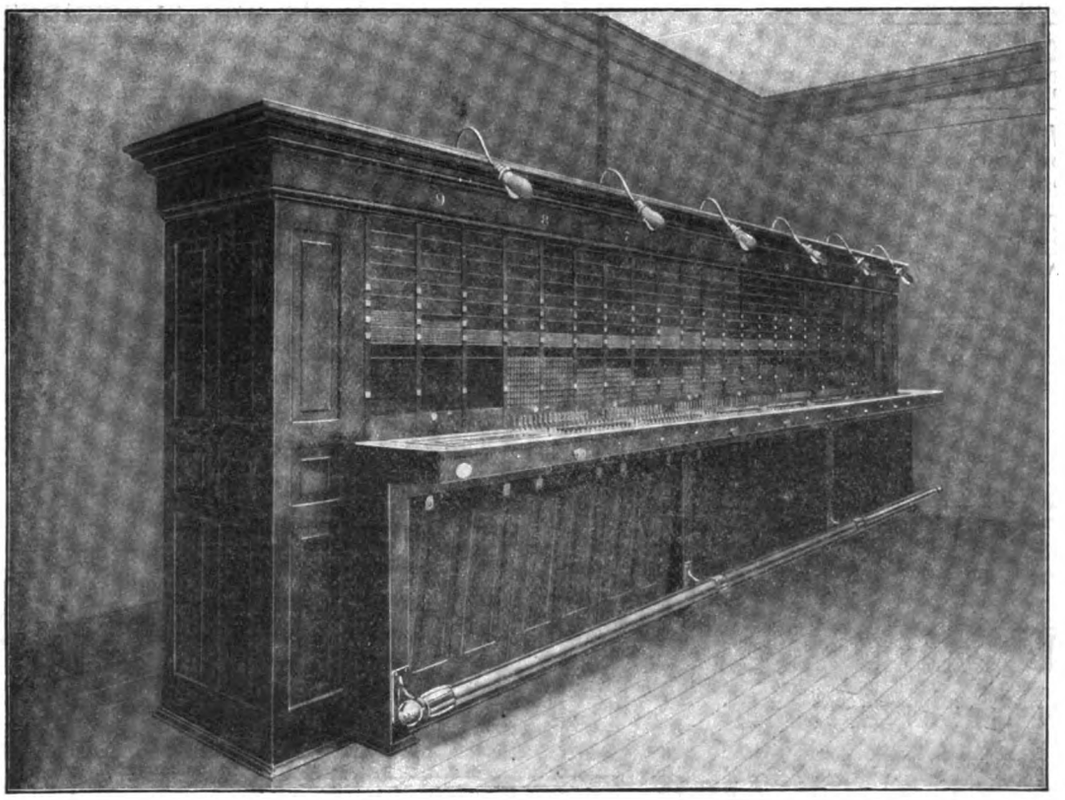
DEAN TELEPHONE APPARATUS

DEAN MULTIPLE SWITCHBOARDS



OUR POUGHKEEPSIE, N. Y., SWITCHBOARD.

The above illustration shows the type of the twelve common battery multiple switchboards that we have built or now have under construction—our first nine months' switchboard business.

	Lines Capacity.	Section Size.		Lines Capacity.	Section Size.
Racine, Wis.	5,000	6,400	Dunkirk, N. Y.	1,500	6,400
Pittsburg, Pa.	3,000	3,600	Watervliet, N. Y.	1,500	6,400
Niagara Falls, N. Y.	3,000	6,400	Malone, N. Y.	1,200	6,400
Kingston, N. Y.	3,000	6,400	Medina, Ohio	1,200	6,400
Poughkeepsie, N. Y.	3,000	6,400	Potsdam, N. Y.	1,200	6,400
Plattsburg, N. Y.	1,500	6,400	Bangor, Pa.	500	3,600

This is an unprecedented record when it is remembered that just ten months ago we commenced the manufacture of common battery switchboard apparatus.

There must be a *reason*. If you are a user of Dean apparatus, you will know the *why*.

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VOLTAGE AND AMPERAGE
STAMPED ON EVERY ONE.
STRONGER BY 30 PER CENT. THAN ANY OTHER MAKE.

THE FI-NE TUBULAR DROP
SIMPLE, SENSITIVE, EFFICIENT.

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FOR ADJUSTING THE BELLS OF A LINE OF BRIDGING PHONES TO RING CORRECTLY.

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FOR COMPACT TELEPHONES. SOLID, SUBSTANTIAL, SAFE. YOU CANNOT LOSE THE SCREW.

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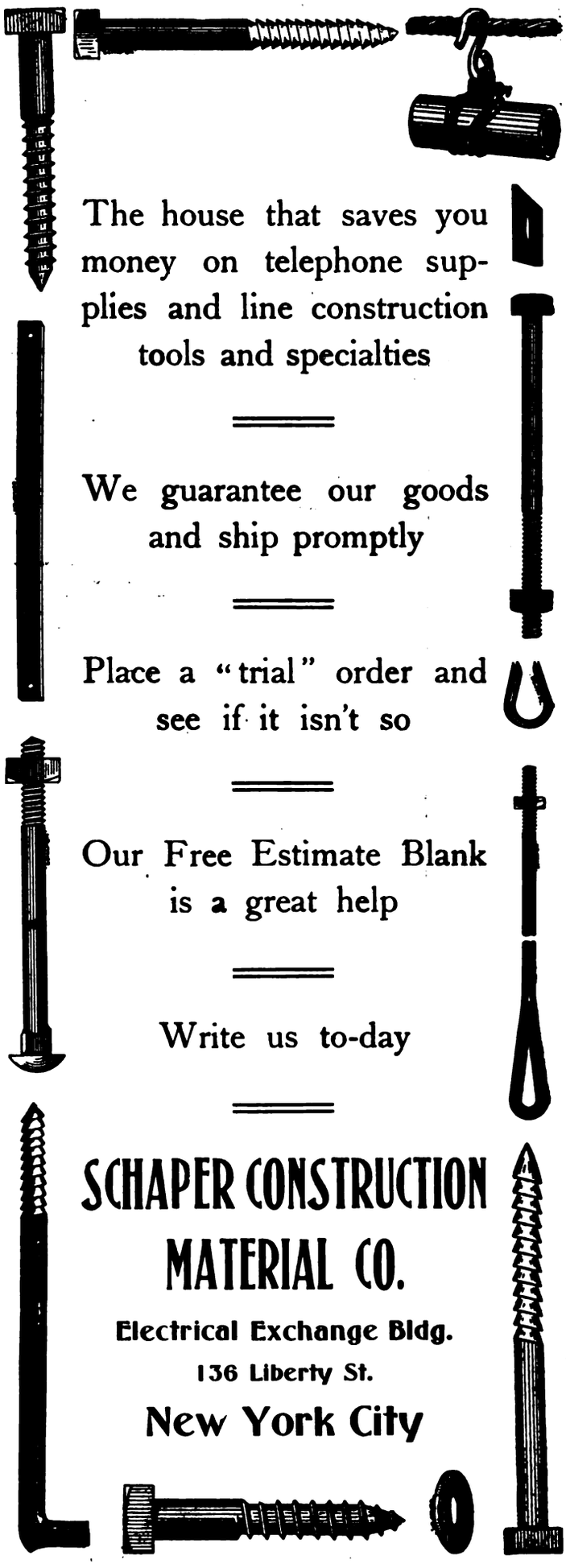

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Cadiz Electric Co.	—	Page & Hill Co.	37
Central Telephone & Elec. Co.	—	Pendleton & Gilkey	38
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Cook, Frank B.	—	Porter Cedar Co.	38
Crumb, W. H., & Co.	37	Roebling, John A., Sons Co.	3
Dayton Mfg. Co.	33	Roth Bros. & Co.	33
Dean Electric Co.	7	Runzel Lenz Elec. Mfg. Co.	—
Doubleday-Hill Electric Co.	—	Sand Point Cedar Co.	36
D. & T. Anchor Co.	32	Schaper Construction Material Co.	8
Eastern Telephone Mfg. Co.	32	Simplex Electric Co.	1
Electric Appliance Co.	14	Standard Underground Cable Co.	—
Electric Storage Battery Co.	3	Stanton, L. W.	1
Ewing-Merkle Electric Co.	—	Sterling Electric Co.	11
Fahnestock Transmitter Co.	31	Sterling, W. C., & Son	38
Farr Tel. & Const. Supply Co.	14	Stromberg-Carlson Tel. Mfg. Co.,	12 and 13
Fisk Newhall Tel. Mfg. Co.	8	Sumter Tel. Mfg. Co.	35
Frankel Display Fix. Co.	14	Telephone Printing Co.	33
General Storage Battery Co.	33	United Telep. & Switchboard Co.	—
Gest, G. M.	39	Valentine-Clark Co.	—
Gray Telephone Pay Station Co.	31	Vought Berger Co.	11
Guarantee Telephone & Equip. Co.	2	Wanted, Situations, etc.	32
Haller Machine Co.	—	Waterbury Company	1
Hallett Iron Works	3	Western Steel Gate Co.	—
Hanson, C. H.	1	Weston Electrical Instrument Co.	37
Hemingway Glass Co.	—	Williams Telephone & Supply Co.	34
India Rubber & Insulated Wire Co.	1	Wilson, J. I. M.	38
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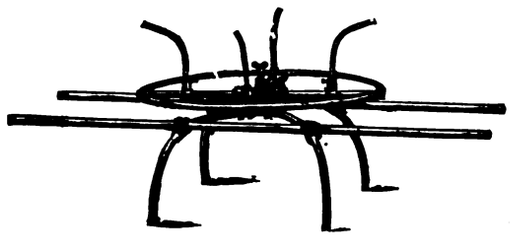
We make a large variety of Reels—but in all these specifications are followed. Note the peculiar construction of the Reel pictured here.



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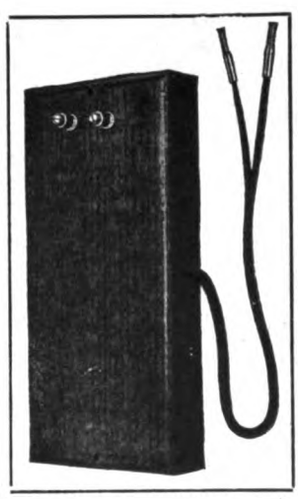

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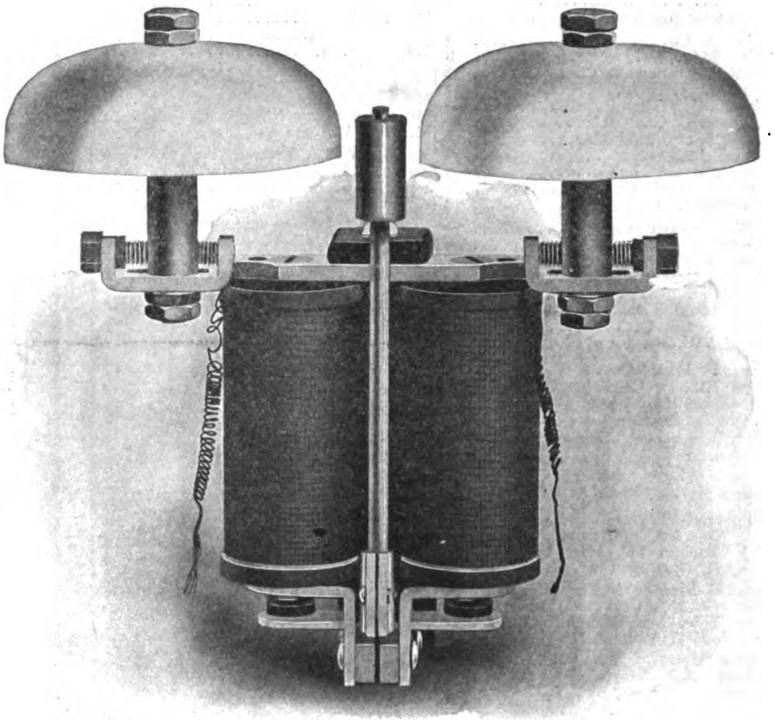

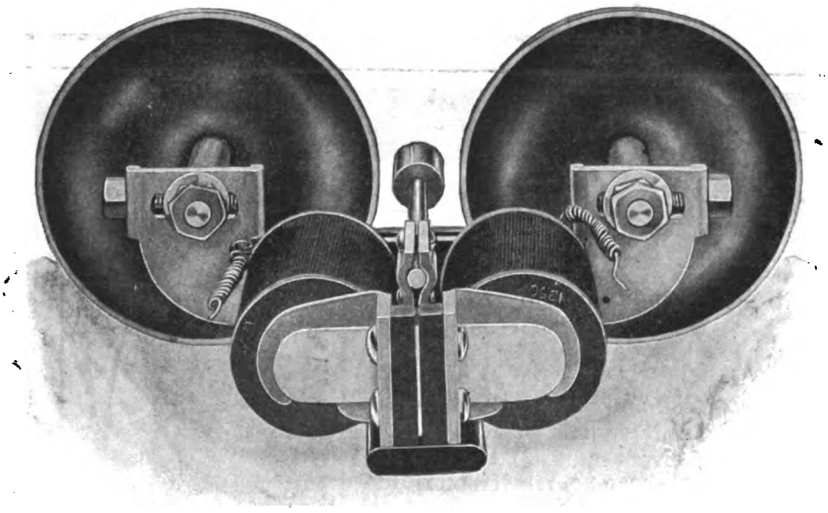

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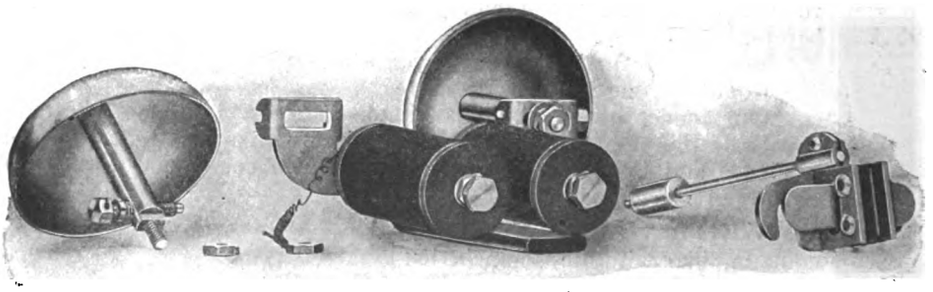

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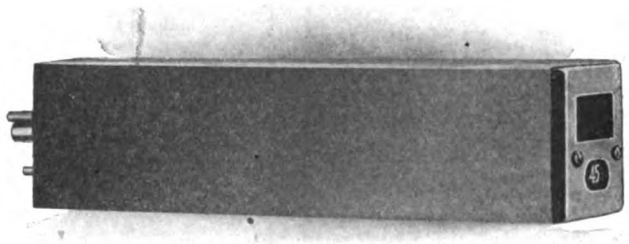

Fig. 1.

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Fig. 1 shows a complete signal, and Fig. 2 signal with shell removed.

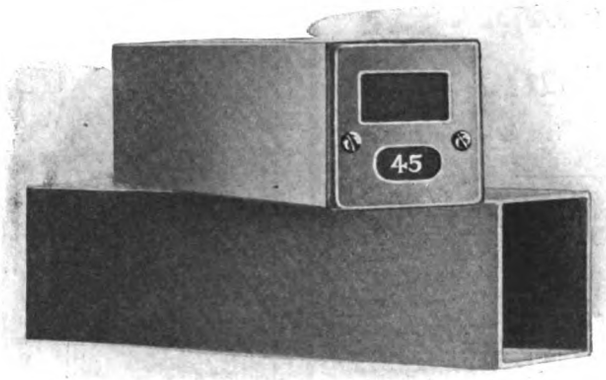

Fig. 2.

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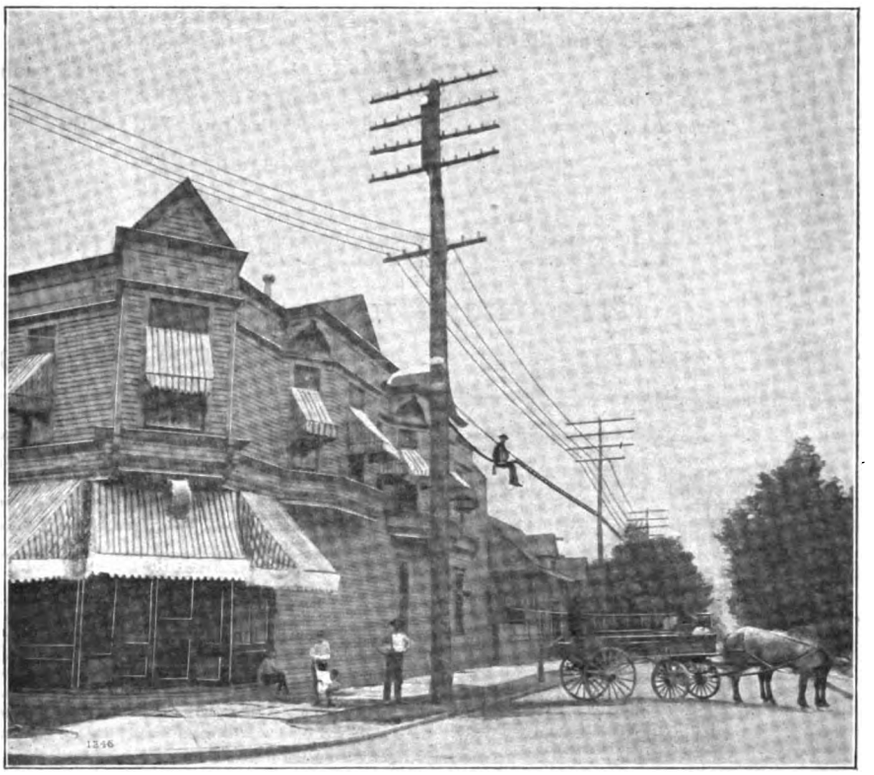

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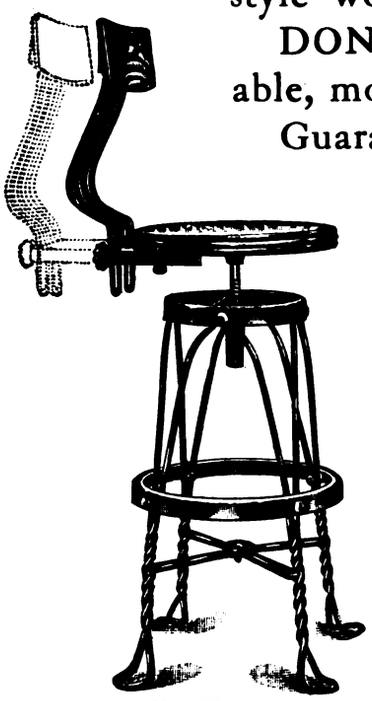

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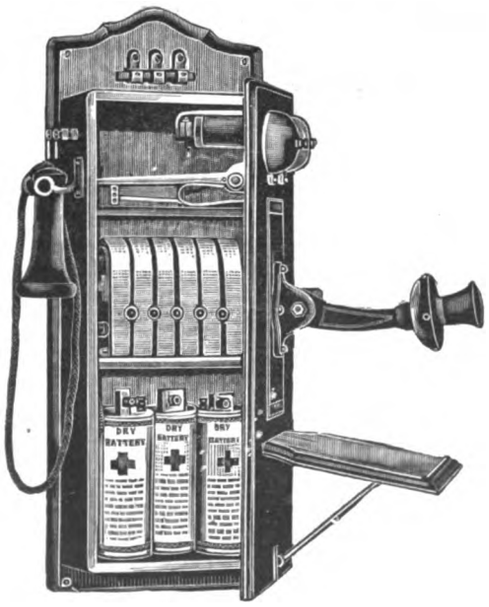

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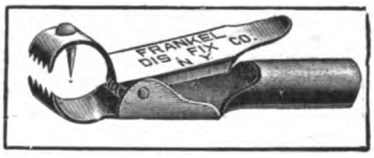

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A Communicating Block Signal System

By Edward A. Tyler.

DEVELOPMENT of interurban electric railways has necessitated the use of apparatus for the protection of moving trains, which will assure safety in as high a degree as that required for the protection of high speed main line steam roads. For the steam railway, the block system is considered to be the most practical method of protection. It consists essentially of the subdivision of the main line into blocks. At the entrance to each block are two semaphores. These ordinarily extend at right angles to the track. Both semaphores will hang downwards prior to a train entering one block, if the two blocks ahead are clear. If the block immediately ahead is clear, but the one further on contains a train, the upper semaphore will hang downwards, while the lower semaphore will remain horizontal, indicating to the enginer that the block ahead of the one he is entering is occupied. If there is a train in the block immediately ahead, then both semaphores extend at right angles, and, according to the laws of the road, no train is permitted to pass the semaphore signals protecting that block.

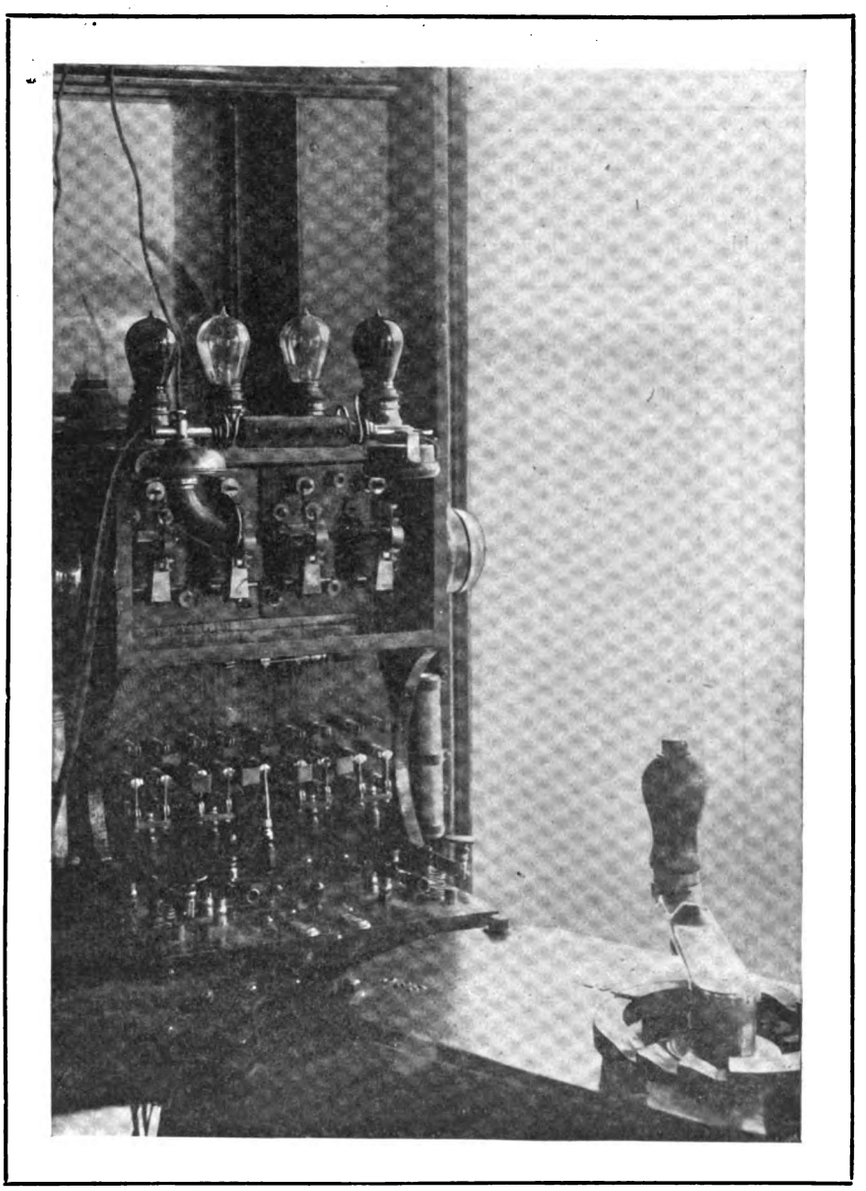

Fig. 1.—Railway block signal system equipped with telephone apparatus to establish communication between trains and stations.

Numerous schemes have been originated which had for their object means of communication between the train and the signaling stations or towers along the line. Either from complexity of apparatus or inherent faults, they have never been valuable from a commercial standpoint. However, a system which embodies many new and original features has been devised, which possesses features of great promise. This is known as the McClintock Automatic Block System. It consists essentially of indicating instruments upon the trains, associated with telephone and telegraph circuits, together with similar apparatus located at the railroad stations. Connection between the two is established by means of auxiliary rails, which lie within the regular rails. The auxiliary connecting rails, or conductors (see Fig. 3) are divided into sections called blocks, and insulated from each other and the main rails in such a way that one block overlaps the other one-half its length. These rail blocks are made from three to six miles in length. The track rails are electrically bonded at each joint, thus making two complete conductors. When a train enters a block not occupied by another, a white light signal is displayed in the cab, unless there are broken rails or open switches. This lamp is controlled by a relay, and the current to actuate it passes from one main rail to an auxiliary rail, through a relay in the station, or at the end of the block. These relays are made to open and close their contacts every half second, flashing the white lamp, so that there can be no mistake in their perfect operation. When two trains enter a block, each engineer is warned by a red light and bell. This warning is received by the instruments in both trains, and indicates to the engineers the location of the other

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train; whether it is ahead or behind. The pole changer is automatically locked, thereby making an uninterrupted circuit over which the engineers of the two trains may communicate by means of the telephone or telegraph. In Fig. 1 the apparatus is shown mounted in the cab of a car of the Indiana Northern Traction Line at La Fontaine. Two lamps, the right and left, give red danger signals; the middle two white safety signals. Below is shown a system of relays. At the base of the cabinet are controlling switches and telegraph keys. The controller handle of the car motor is shown at the right of the illustration. For signaling purposes, pole changers and generators are installed at the main stations, and upon the cars. The pole changers give flashing signals, and the generators furnish the necessary current to operate the same. The actual size of the switching apparatus is 8 x 14 x 20 inches; so it is obvious that it does not occupy much space. The circuits pass through the relays, dynamo and pole changer and over one side of the track rail. When a train enters a block occupied by another train, the current generated by the dynamo in the other car will form a complete circuit between each train and one of the auxiliary rails. It will thereby light one of the red signals, sounding the electric gong. Giving the lamps, Fig. 4, the distinguishing letters *A, B, C* and *D, A* and *B* would be the safety and danger signals, associated with the left hand auxiliary and main rails; and *C* and *D* would connect with the right hand auxiliary and main rails. It has been stated already that the auxiliary rails are separated into blocks, with one block overlapping the other one-half its length. Thus a train, *K*, entering a block consisting of the left hand auxiliary rail, would at the same time be in the center of the block section of the right hand auxiliary. It will be readily understood that if a train, *F*, enters the block from the opposite direction, a similar condition of affairs exists. This would cause the danger signal *A* of the train *K*, and *D* of the train *T* to flash; because their circuits are closed through the continuous block auxiliary rail and the main rail. But the danger signal *D* of train *K*, and *A* of train *D* will not light, because the block rail is open at a point midway between them. If, however, a train *S* follows *K*, and enters the right hand block length associated with signal *D*, in train *K*, both *D* danger signals will light, because the circuits are closed through the intact block length of the auxiliary rail on that side. The danger signal of the train connected with the left hand rails will not light, because of the open block circuit on that side. It is evident that the engineer or motorman can tell immediately by this means from what direction the approaching train is due.

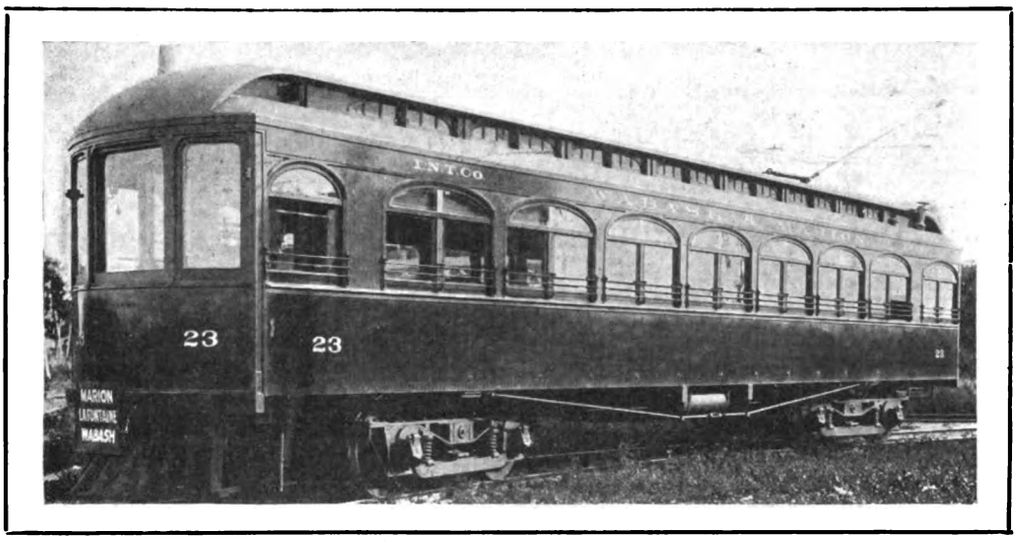

Fig. 2.—High speed electric car equipped with communicating block signal system.

In connection with the operation of the signals, is a resistance box, which is so constructed that the amount of current passing through it will permit the white light to burn, indicating that the lines are clear. But a sufficient amount of current will not go through to illuminate the red lamp until the engine carrying a similar device enters the same block. Then the added electromotive force of the generators of each engine will force through the circuit sufficient current to operate the red signal through the relay circuit. This signal will also give warning of a broken rail, open switch, washout or burned bridge or culvert by means of special devices which come into action on the failure of any of these portions of the roadbed.

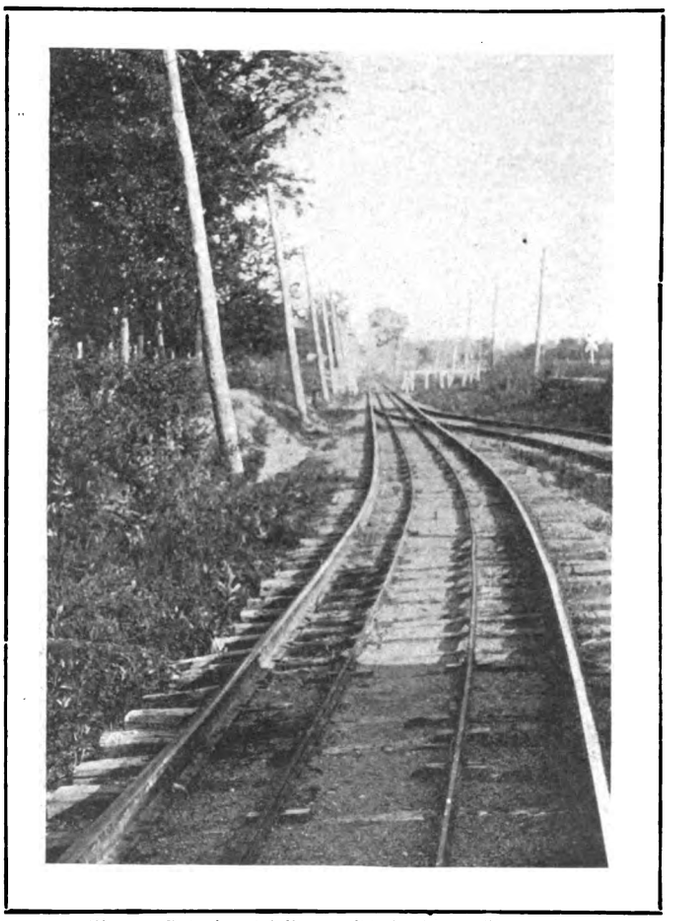

Fig. 3.—Experimental line equipped with auxiliary rails.

An official at any station who wishes to communicate with a train on the same block may, by closing a key, cause the bell to ring until the engineer cuts in his telephone to answer. The dispatcher or other person can communicate with a train many miles away by having the station agent nearest to the train plug the track circuit in on a long distance telephone line.

When it is required to communicate between one engineer and another, or between an engineer and a station, certain switches, when actuated, will lock up the pole changer, so that it will not make or break the circuit, thus interfering with conversation. This is an important feature, as otherwise it would be impossible to communicate definitely.

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The manufacturers claim for this system great economy in material, cost of construction and maintenance. In an ordinary system of 2,000 miles of track, using the McClintock apparatus, upon 400 locomotives or cars, there would be only 400 signaling devices to supervise; whereas, if the automatic block signals are employed, 2,000 miles of circuit must be maintained, and from 2,000 to 2,400 semaphores required. In a manual block system at least 150 operators would be necessary.

Looking at the proposition from the standpoint of efficiency, in the manual block system there is liability to error, through misunderstood orders, and the fallibility of human intelligence in throwing the signals. In the automatically operating system, failures through snowstorms, smoke and freezing is possible; whereas in the McClintock system, it is claimed, no failure can occur as long as the train remains on the rails.

From the stanpdoint of expense, the McClintock system will cost $1,000 to $1,500 per unit to install. It can be maintained at a cost of $10.00 per year. The automatic system will require the expenditure of from $1,500 to $2,000 per mile, and the maintenance cost average from $120 to $150 per mile per year. iWth the manual system, the charges for installation will depend entirely upon the system and the extent of its use; but in maintenance, considering the cost of the operator's time, it would approximate $140.00 per year per mile.

Looking at it from the standpoint of operation: The manual system is worked by despatcher's orders to station operators only; the automatic system by despatcher's general orders; the McClintock by despatcher's orders, automatic connection between trains, and by direct telephone and telegraph communication.

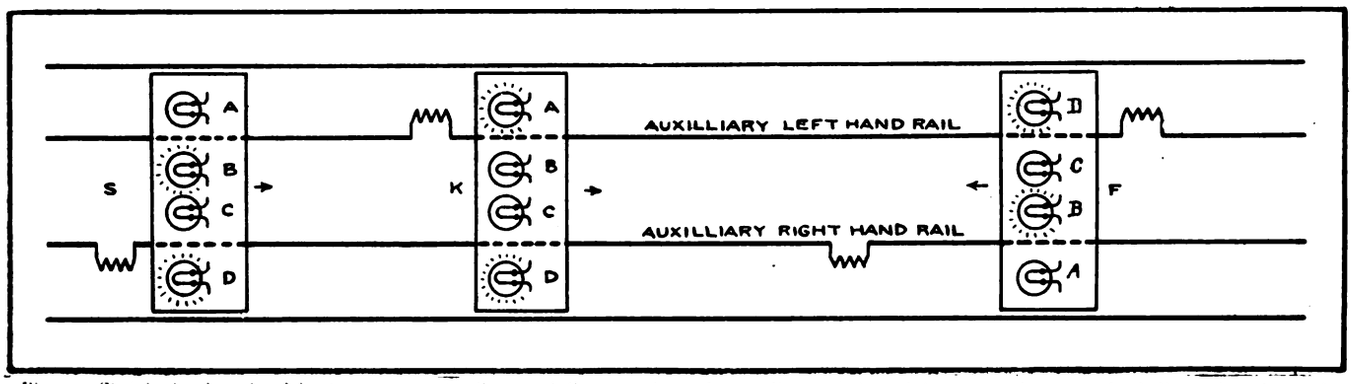

Fig. 4. Sketch showing signal lamp arrangement. S, K and F are trains. Lamps lit are indicated by rays. Arrow marks indicate direction trains are moving.

Private Exchange Installations—Circuits

ARTICLE II.

By Chas. H. Coar.

THE selection of a switchboard or the existing conditions which have to be contended with during operation should be considered. If the system is to be installed in close proximity and in conjunction with a telephone exchange, if it is possible the current supply for its operation may be secured from the main exchange battery. If this is not possible, owing to the distance between the telephone exchange and the private system or to the scarcity or high value of the conductors between these two points, a local battery must be installed. Irregardless of these facts, such systems should be designed to operate in the simplest manner and with the least amount of working apparatus.

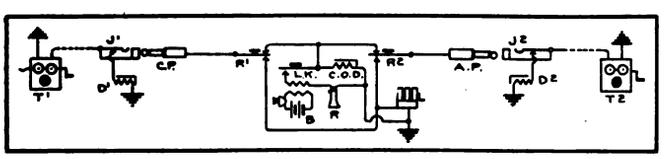

Fig. 7.

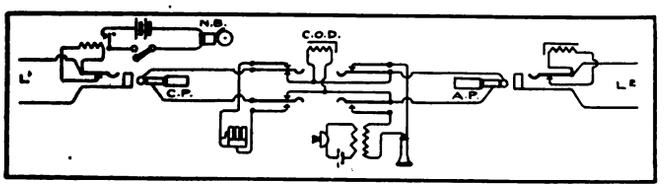

Fig. 8.

They should also be designed to operate with a minimum amount of battery.

As the circuit arrangements of private branch exchanges have passed through the same development which occurred in main exchange apparatus, it was not until recent years that private systems were arranged to operate with central energy, because many engineers thought it unwise to place complicated apparatus in the hands of inexperienced persons.

For this reason the magneto arrangement was not superceded by the central energy method for some time after its adoption in regular exchange apparatus. The circuit shown in Fig. 7 is one of the arrangements used in the early days of private installation. It will be noticed that one side of the circuit is grounded and that the operator can call over either cord by means of the Generator *G*, and ringing keys *R1* or *R2*. A clearing out drop C. O. D., is bridged to ground for supervision over the calls.

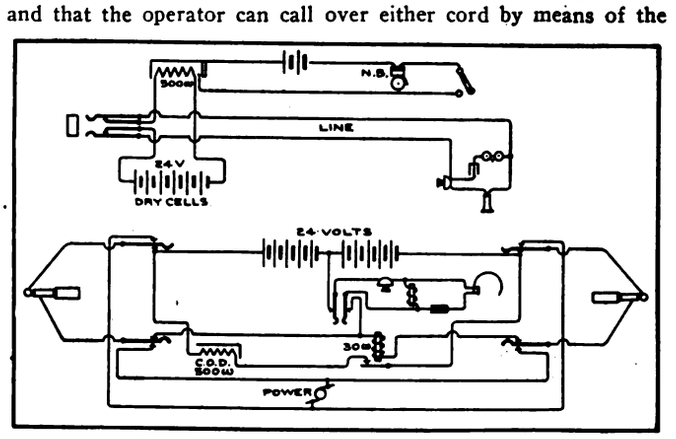

Fig. 9.

As electric power and railway circuits increased it became necessary to devise systems which would be free from ground connection, because grounded lines became susceptible to many earth noises caused from stray currents. Therefore the metallic system was devised. This in turn was adopted by the private systems.

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The circuit shown in Fig. 8 illustrates the ordinary arrangement of a magneto metallic system. In this circuit the telephones are connected to the lines *L1* and *L2*. It will be noticed that the drops are cut out the circuit when the plug is inserted in the line jacket. The operator can call over one plug only, which is termed the calling plug, or *C. P.* A 1,000 ohm drop is bridged permanently across the cord circuit as a supervisory signal.

A night bell attachment is shown in connection with the line

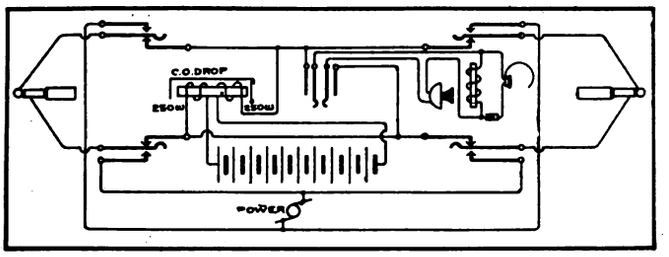

Fig. 10.

drop circuit to signal the operator, as she often has other duties which requires her absence from the board. A switch is provided to cut the night bell out of circuit when desired.

As improved automatic methods were adopted in exchange apparatus the subscribers of private systems objected to the magneto method of calling their operator. To overcome this trouble several methods were tried. In one instance ringing current was distributed to the different telephones which could be impressed on the lines by means of a push switch. In other cases, coils were so arranged that an inductive "kick" would be impressed on the line to throw the drop. These methods did away with the use of the magneto generator, but they had disadvantages. More wire was necessary and the push buttons or other auxiliary apparatus was continually getting out of order.

One of the simplest systems operating on the central energy basis is shown in Fig. 9. In this it will be seen that the current is obtained from dry cells and that the arrangement is such that the different line drops are actuated by a battery of 24 volts when the receivers are off the hook. This battery is common to all the lines and is disconnected from the lines and drops as the plugs are inserted in the line jacks. A 500 ohm drop is used as the line signal and the telephones can be any of the central energy type. A night bell attachment is shown in connection with the drop circuit. Each of the cord circuits has its individual battery of 24 volts arranged in series with the tip conductors, and with the two telephones when a connection is up. A 30 ohm relay is placed in series with the sleeve conductor, which operates when both parties are talking, closing the contacts of the 500 ohm supervisory signal, which is then placed around the cord battery. This signal will remain actuated until either one of the parties

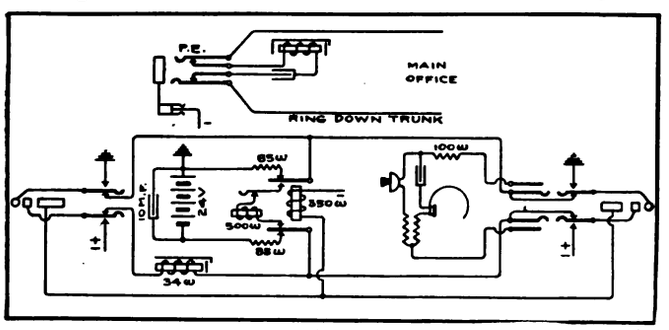

Fig. 11.

hangs up his receiver. The operator's talking set is connected directly to the middle of the cord battery, thus enabling her to talk over either plug. In this circuit it is possible to ring over either cord, power connections being provided at each key as shown. A further description of this circuit will be given later.

The circuit shown in Fig. 10 is so arranged that the different cords receive their current supply from one central source. In this circuit, the battery is supplied to the top and ring conductors of each set of cords through coils which are oppositely wound upon a single core. These coils have a resistance of 250 ohms each and present considerable inductance, thus confining supervisory signal, the adjustment being such that when two parties are connected sufficient current will flow through the wind-telephones themselves. The coils also serve the purpose of a the larger portions of any change in the talking current to the ings to attract the armature, thus displaying the signal. A further description of this circuit will be given later also.

In the circuit shown in Fig. 11 it will be noticed that the apparatus is more complicated, and that a third conductor is used in the cord circuit.

This circuit is so arranged that the entire installation, including the drop circuits, receives its current from a single set of buss cars, which may be supplied from the main exchange battery or from a local set of primary cells. No local drop circuit is shown because this would be much the same as is shown in Fig. 9.

When a connection is made with this cord circuit between two telephones of the private system, current for talking purposes is supplied through the 85 ohm windings of the repeating coil, thence through the normal contacts of the 350 ohm cut-off relay to the tip and ring conductors. A 34 ohm supervisory signal is arranged in series with the ring conductor, which during local connections is entirely controlled by one of the connected parties, because of its relative position with regards to the battery taps and plugs. A sufficient number of condensers to have a combined capacity of about 10 M. F. are placed in multiple with the battery leads to prevent cross talk. In the circuit shown it is possible to ring over either cord. The operator's talking set receives its current supply upon connection with the cord circuit.

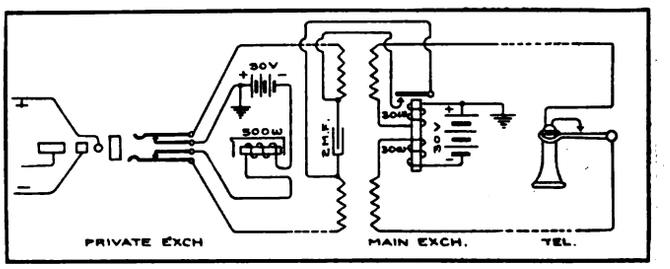

Fig. 12.

The ring down trunk shown in Fig. 11, which is used for connections between the private and main exchanges, has a condenser placed in series with the drop circuit at the private exchange to prevent a constant flow of current from the main office over this circuit. The main exchange end of the circuit terminates in the same manner as a regular subscriber's line.

The sleeve portion of the jack shown is connected to the positive battery lead through a cut out key, for the purpose of furnishing a current through the sleeve conductor of the cord and cut-off relay when a connection is made with this circuit. When a cord is connected to this trunk jack the cut-off relay of the cord is operated, cutting off the local supply of battery. During a connection between any telephone of the private exchange and the main exchange the current for talking purposes is supplied over the trunk circuit from the main exchange battery, thus reducing the load on the local battery leads. As the supervisory signal of the cord circuit is permanently connected in the ring conductor it will serve its purpose during these connections. The 500 ohm holding cord which is placed in series with a key and the inner contacts of the cut-off relay holds the main exchange operator's supervisory signal during the operation of the trunk circuit. In this manner the private branch operator has complete supervision over the private branch and of the trunk circuit, otherwise the main exchange operator might ring in on it before the connections were cleared, thus causing confusion. When it becomes desirable to connect certain telephones of the private system with the trunk lines, during lunch hour or over night the key in series with the holding coil is provided for this purpose. At such times the holding coil circuit is opened at this point and the trunk circuit is cleared of all apparatus. The connected

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telephone of the private exchange then becomes a part of the main exchange and works as such.

Quite often very long lines are used in connection with private exchanges, and the two portions of such lines usually terminate in the main exchange where connections are made between the various cable conductors used to complete the line.

Owing at times to the extra long distance between the private exchange and the telephone, or to the resistance of the conductors between these points, it is impossible to secure satisfactory signaling results. The circuit shown in Fig. 12, which may be called a repeating circuit, is sometimes employed to overcome this difficulty. The telephone is connected through apparatus at the main exchange to the private switchboard. In such exchanges as have many private branch systems depending on the main battery for their current supply, it is usual to install a booster battery of a few extra cells, which will raise the voltage somewhat higher on the private exchange leads than is employed in the main system. In this instance it is assumed that 30 volts is available in the exchange. Then the operation of the circuit is as follows: When the receiver is removed from the telephone the circuit is formed from the 30 volt battery through the 30 ohm windings of the relay and through the two windings of the repeater and telephone. This causes the relay to close contacts which short-circuit the condenser in series with the windings of the repeating coil in the switchboard portion. A circuit is then provided for the line current from the private switchboard and the line signal is actuated. It will be readily seen that the scheme is to divide the complete circuit into two parts, and to supply each part with separate battery feed. In this manner the signals are relayed while the speech and ringing current are repeated by induction.

(To be continued.)

Auxiliary Battery Sets

By C. S. Bundesman.

THE cells in use on pole changers of the Laclede type require daily attention, as the life of the zincs, after a certain period of operation become limited and their deterioration may open the circuit unless provision is made to meet this difficulty. If the cells become weak and require rehabilitation the common practice is to strap out a certain number and recharge them, replace these and strap out the second lot until all have been renovated. This operation has many disadvantages, especially where the selective ringing system is used, as the cutting out of ten or twenty cells will greatly reduce the voltage of the current. The bells that have been adjusted to a higher voltage will then respond but feebly. As the operation of recharging these cells takes time, complaints of this nature will be received. As a protection against this occurrence, the circuit illustrated was designed and can be installed at little expense.

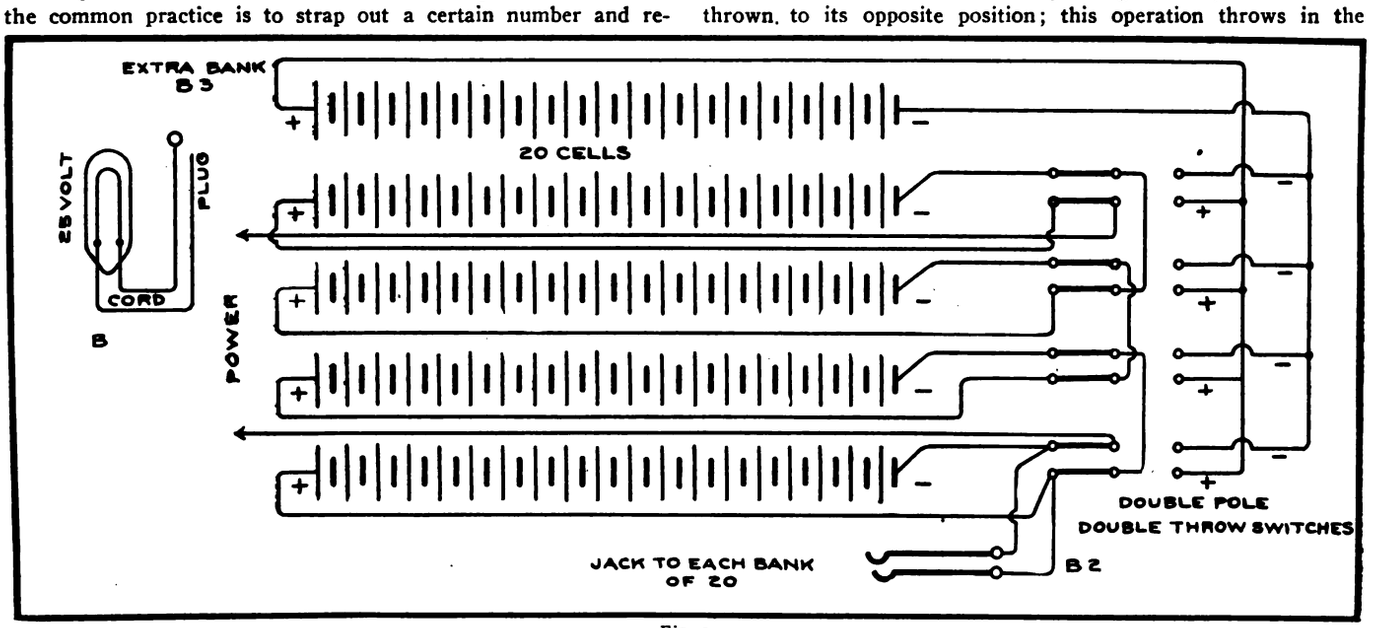

Fig. 1.

It consists of a two-point spring jack and a double throw double pole switch for each battery of twenty cells. Also one at Fig. 1. The only point necessary to call attention to is the are wired as given at B, Fig. 1. The knife switches are wired as at Fig. 1. The only point neessary to call attention to is the arrangement of the cells. These must be so placed as to have the positive pole at one end and the negative pole at the other. To each of the switches the spring jack should be connected as at B 2, Fig. 1. If at any time the zincs should be much wasted, the wire chief upon notification by the operating department must take the plug B, Fig. 1, and insert it into the jack B 2, Fig. 1, corresponding to the first set of cells. If the lamp lights brightly it indicates that the batteries of this bank are all right. This operation is carried on with the cells of the remaining sets. When the plug is inserted into a jack and no light is obtained, it indicates the battery causing the trouble. When this information is obtained the switch corresponding to the jack should be thrown to its opposite position; this operation throws in the auxiliary set of cells, B 3, Fig. 1, and at the same time opens the circuit of the set of cells that are defective.

Fig. 2 shows the auxiliary set in operation, and represents the

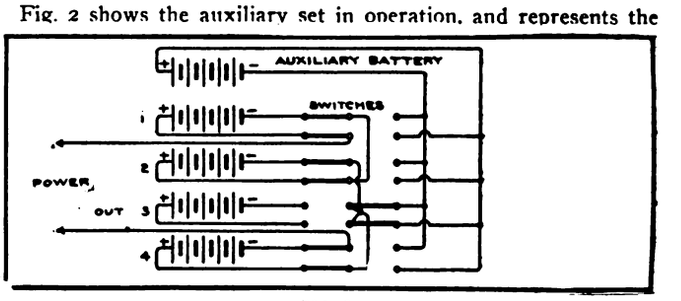

Fig. 2.

third set of regular cells out of service. The operation of testing and throwing in the auxiliary set of cells takes only a few seconds, therefore there is no interference with the service. For recharging the cells the switch should be thrown over and the first set recharged. This system will be found especially good for circuits using selective pulsating currents, as it is then possible to maintain the correct voltage at all times.

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IN THE OPERATING FIELD

INCREASE IN VALUATION OF TELEPHONE PROPERTY IN DAKOTA.

AN idea of the growth of telephone lines in South Dakota is gained from the figures produced by the State assessment board, which increases the valuation of telephone property from $345,366 to $616,441. This property is owned by 141 different companies. Most of these companies represent neighborhood systems among farmers, but these small systems are usually connected with some large system and the people of the east half of the State are generally within speaking distance of each other.

INDEPENDENTS GAIN CONTROL OF SEVERAL PLANTS IN OHIO.

INDEPENDENT telephone managers of Ohio are making a very earnest effort to prevent any of the smaller Independent companies falling into the hands of the Bell. In this work the State association is able to render effective service, and by keeping in touch with the existing conditions it is able to find purchasers for the smaller companies if they are in the market, and thus prevent the Bell making any inroads in the Independent field.

Some weeks ago the Bell people made efforts to acquire control of the Independent companies at Mt. Vernon and Bellevue, and were in a fair way to win control when President Frank Beam of the Ohio Independents came into the field, and in a few days was able to take control of the plants himself and turn them over to permanent owners, who are allied closely with the Independent management in the State. The Bell people were also planning to get hold of the Independent exchanges of Norwalk and Monroeville, which would have partly cut the chain of Indpendents in that portion of the State, when Mr. Beam went to Toledo after getting an option on the properties and secured a syndicate with $50,000 to take over the plants.

So far in the fight for the control of the small plants the Independents have been successful, while the Bell has lost some plants with which it was formerly maintaining long distance connections. The plant at Perrysburg was purchased by some of the stockholders of the Independent company at Toledo and was turned over to that company for operation. This was most important for the Independents as it gave them a foothold in Wood county, a place filled with oil companies where there is a large amount of long distance business and where there is a fine field for development.

INDEPENDENT LINES DEVELOP THE WESTERN PART OF VIRGINIA.

THOUGH the railway has made little progress in the western part of Virginia, adjacent to the West Virginia counties of Pendleton, Randolph, Pocohontas and others, Independent telephone lines have entered this field and brought its inhabitants within easy communication with the more thickly populated section of the Shenandoah Valley in Virginia and the valley of the Greenbrier and the New River, along the Chesapeake and Ohio Railroad, in the central part of West Virginia.

Durbin, in Pocohontas county, which five years ago consisted of a few farm houses and a village store, has grown into a thriving mountain village and has been selected as the point of communication for Independent lines from Staunton to Ronceverte on the south, and from Staunton into Randolph county to Elkins on the north, at which place direct communication with the northwestern part of West Virginia is secured.

Last August the Monterey Telephone Company, of Monterey, Virginia, sold its business to the Ronceverte and Elkins Telephone Company, which has commenced to build a metallic circuit from Staunton to Durbin, West Virginia.

The old mutual line which has been operating from Staunton to Monterey, will continue under its old status from Staunton to the Mountain House at West Augusta, Virginia, and will transmit messages over the same poles and cross-arms as serve for the new line. The new line is to be equipped with the best material, and will run from Staunton to Durbin, four hundred and fifty miles; from Durbin to Ronceverte (which is already in operation), and from Durbin to Elkins (which is to be constructed in the near future), besides numerous feeders from every point along the route, the most important of which is from Monterey to Franklin, the county seat of Pendleton County, a distance of thirty miles or more.

This Independent development will open up the northern part of Virginia and the adjacent counties of its sister State and will bring the mountaineer—who for years has lived in seclusion—in touch with his more cultivated neighbor east of the Allegheny.

A GROUND ROD IDEA.

By Arthur L. Riche.

ANY one who has driven many ground rods has often wished for some method of avoiding the solder connection at the top. If made before driving, it is a hard matter to set the rod without breaking the solder, and it is a difficult job to solder it after the rod is set. A method which avoids difficulties and has proven successful is to have a small hole punch near the end to be driven into the ground. Through this draw a piece of No. 12 galvanized iron wire. Wrap one end around the rod. Continue the other to the top, where it should be twisted around several times to make a neat appearance and then run up the side of the building.

INDEPENDENT MANAGERS AND OPERATORS ON A TOUR OF INSPECTION.

SEVERAL of the leading Independent managers and operators are at present making a tour of the principal cities with a view toward future long-distance service. In the party which recently visited Pittsburg, Pa., and Rochester, N. Y., were Breckinridge Jones, C. Marquand Forster, William F. Nolker, H. Linton Reber, W. Roy McCanne, W. G. Leckey, Harman C. Stifel and Adolphus Busch, of St. Louis; Joseph J. Heim and O. C. Snider, of Kansas City; H. B. Sale and Newton Todd, of Indianapolis; J. B. Hoge, of Cleveland; J. C. Splane, president of the Pittsburg & Allegheny Telephone Company, and the following directors and stockholders of the company: Robert C. Hall, H. B. Beatty, Frank Hart, N. C. McPherson, William Finn, D. P. Reighard, John S. Weller, R. H. Binns, Ralph E. Flinn, all of Pittsburg, and H. M. Nichols, of Oil City.

GROWING DEMAND FOR INDEPENDENT SERVICE IN MEXICO.

IN Guadalajara, the second largest town in the Republic of Mexico, the Independent company, "Compañia Telefónica Jaliscense," S. A., under the able management of Señor Morfin Silva, is making splendid progress. This company started about three years ago on a very small scale, when the Bell at that place had already an old exchange of several hundred subscribers. While the latter's number of subscribers has now

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dwindled down to 150, the Independent company has over 800 bonafide subscribers, with lines running all over the state, some of them 200 kilometers long.

The instruments used are partly Ericsson's and partly Norwegian make, of the latest, up-to-date pattern. The exchange so far is equipped with 100 line Standard boards, but has modern cross-connecting and fuse-frames and is otherwise very neatly and practically arranged. The long lines, although far from being built on American Long Distance principles, work remarkably well and are in constant use. There are no special charges for their use and this is probably the secret of the popularity and success of this company. Subscribers pay $3 per month (Mexican) and they are fully as pretentious, as far as good service is concerned, as any New Yorker. Although this company has a very good overhead system on iron fixtures (which, by the way, are all straight) over the housetops, there will probably be soon a reconstruction, and the principal lines within the central part of the city will probably be laid underground.

HOME COMPANY, OF LOS ANGELES, CAL., HOLDS MONTHLY MEETINGS.

"HOW to build telephones" was a subject discussed by officials of the Home Telephone Company, of Los Angeles, Cal., at its last monthly meeting.

A paper on engineering, giving some tips on building telephone lines was read by Charles L. Zahn, chief engineer of the system. D. S. Parker, manager, at Pomona, "sang a song of 'phone poles," telling how the Sunset enemy had been discomfited. Arthur Wright, attorney of the United States Long Distance Telephone Company, Louis Blankenhorn and Ira J. Francis also were speakers.

Among those present were E. L. Swain, general manager at Los Angeles; C. C. Craig, assistant general manager; M. L. S. Mitchell, exchange manager; Charles L. Zahn, chief engineer; W. E. Rose, manager of the directory department; A. L. Orton, general manager at Pasadena; Robert Tucker, director, from San Diego; Charles Temple, manager of the United States Long Distance Telephone and Telegraph Company; W. L. Frew, of Compton, president of the association; K. C. Wells, of Redlands, and W. J. L. Lambert, of Riverside.

TELEPHONE LINES IN POLK COUNTY, IA., NEARLY TREBLED IN EXTENT IN ONE YEAR.

POLK COUNTY, IA., telephone and telegraph mileage has almost trebled during the past year. Auditor Lew Burnett to-day received from Secretary Davison the figures for the county. The mileage this year is 978.78. Last year it was but 306. The assessment this year is $89,075.28. Last year it was $61,080.

The Mutual Telephone Company, of Des Moines, is the heaviest taxpayer with 104 miles, at $384.60 per mile, totaling $39,998, and the Jasper County Telephone system is next with 187 miles and a tax of $12,108.25.

AN INDEPENDENT LONG DISTANCE COMPANY ORGANIZED IN THE SOUTH.

AN Independent long distance telephone company is to be established to operate in the southern states, with headquarters at Birmingham, Ala. The new company will compete with the Southern Bell Telephone and Telegraph Co., and propose to erect exchanges in many cities where the Bell Company at present has no opposition. Arrangements will be made for an interchange of service with existing Independent companies operating in this territory.

An agreement which provides for the connection of the lines of this company to those of the Independent at Bowling Green, Ky., long distance company now operating in the middle states is a most important step in the development of long distance business. The construction of lines between Birmingham and Bowling Green is now well under way, and upon completion of this work the company proposes to extend its lines to Mobile, Nashville, and to connect at Jackson, Tenn., with the Independent company already operating at Memphis. The next advance will be to Atlanta, where there is now an Independent exchange. New exchanges are to be put in operation at Nashville, and at Decatur, Cullman, Gadsden and many other cities in Alabama.

J. C. Moncrief is the general manager of the new organization.

TEXAS INDEPENDENT CLEARING HOUSE ASSOCIATION ORGANIZED.

THE Texas Independent Telephone Clearing House Association has been organized in Dallas and application has been made to the Secretary of State for a charter. The purpose of the organization is to organize the Independent long distance telephone business under one head for the mutual benefit of all lines concerned. The incorporators are E. W. Dunaway, Paris; A. J. Brown, Dallas; Cecil L. Simpson, Dallas; J. N. Earle, Waco; J. E. Boynton, Waco; G. R. Butler, Gainesville, and C. A. Shock, Sherman. The main office of the association will be in Dallas and a regular clearing house for the Independent companies of Texas will be established.

HOME COMPANY, OF JOPLIN, MISSOURI, ABSORBS INDEPENDENT LINES.

THE Home Telephone Company, of Joplin, Mo., controlling the Independent lines of Jasper county, is about to absorb the Southwest Missouri Telephone Company's system. The plants in Pierce City, Monett and Aurora are included in the system of the Southwest Missouri Telephone Company.

BELL STATEMENTS FOR BUSINESS AND PLEASURE DO NOT CORRESPOND.

AN appeal issued by the Central Telephone Co. to the farmers of Indiana recites that it has 188,170 subscribers. The states of Indiana, Ohio and Illinois are operated by the Central Union for the parent Bell Co. It made a sworn statement for taxation purposes before the auditor of state that on April 1, 1905, it had 146,244 telephones. In Ohio recently it issued a statement that it had in that state 110,000 telephones, leaving about 36,000 telephones in Indiana and Illinois. By the last enumeration for taxation purposes the Independents have in Indiana alone 156,255.

FACTS AND FIGURES RELATIVE TO THE INDEPENDENT BUSINESS IN INDIANA.

THE Indiana Independent Telephone Association has issued a pamphlet, describing the plan of organization, giving the operating rules adopted and facts and figures relative to the Independent telephone companies in Indiana. The pamphlet states that there are 368 Independent telephone companies in the State, 15,000 stockholders, 175,000 subscribers, 30,000 miles of toll line, 1,560 toll offices, fifteen million dollars of capital invested, and that the gross earnings of last year were $3,500,000.

SOUTHEASTERN IOWA ASSOCIATION TO HOLD ANNUAL MEETING.

THE sixth annual meeting of the Southeastern Iowa Independent Telephone Association will b held at Fairfield, Iowa, on October 10th. All members of the association are urged to attend, as matters of importance will be discussed.

ARRESTED FOR PREVENTING A QUORUM TO ADOPT TELEPHONE FRANCHISE.

ON the order of Mayor J. L. Grigg, at Sparta, Ill., three aldermen who absented themselves from the city council meeting to prevent a quorum and thus defeat a telephone franchise were arrested. M. W. Cottle and J. T. McCulloch, representing St. Louis parties, having secured several thousand acres of oil and gas leases, sought to secure a water, telephone, electric light, gas and street railway franchise from the city. Mayor Grigg and a majority of the aldermen announced a liberal policy at the outset and were in favor of granting the franchise under proper restrictions. Lack of a quorum, however, forced an adjournment. The mayor directed the marshals to search for the absent councilmen, who were found at the post office.

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THE EDITOR'S PAGE

ARE THERE ENOUGH TELEPHONE BOOTHS?

IF enough cars are not run on a railroad, the public enter a lively protest. In the city limits, during rush hours, this is frequently the basis of widespread criticism. In some directions attention is quickly drawn to such deficiencies. Why not in the telephone? Are there enough booths? Is it to be believed that the general public have such few occasions to communicate privately that an absence of sufficient booths is an indication that they don't want to? A vital question, therefore, presents itself in connection with the subject of telephone booths. A question as to whether they have received the attention they should, from those who claim a deep and abiding interest in Independent telephony.

It is unquestionably a matter which relates fundamentally to the healthy growth of a telephone system. All things which succeed do so through an influence, which practically amounts to public approbation, and which has by no means been lacking, where important telephone interests were involved. But has not a recognition been lacking on the part of these self-same telephone interests of the normal requirements of the public? It brings the matter back again to where it started from. The absolute elements of a telephone system are not necessarily those which represent the purely scientific and engineering departments. A telephone system may be roughly divided up into its clerical, operating and outside sections. Each comprises a series of subdivisions, which need not attract attention at this particular moment. But with respect to the outside department, the accessories or parts comprising it, are of immediate interest. The telephone booth, for instance, is a comparatively rare institution in comparison with the frequent installations made in other respects. The surprising thing about it all is this very rarity. As a moneymaker it would be difficult indeed to point to a better example of where the idea it represents is more in harmony with the system with which it is associated. A respectable privacy secured, when communications are of a confidential nature, and in consequence a more frequent use of the booth, seems to outline the conditions in the average case. On the other hand, where such communications extend beyond the usual limits, the necessity for quiet and privacy is doubly obvious. The returns from telephones thus isolated, under equal conditions, would assuredly be greater. In fact, a record kept of an instance where booths were installed shows that the returns after the booths were put in, in comparison with the returns before, were as two is to one.

The natural instinct born and bred in the great majority is to speak just loud enough for those with us to hear. No one likes to made his private affairs a matter of public knowledge. Even because central can listen, an invisible and totally disinterested party inventive talent has been brought to bear to eliminate this possibility. The Independents can accentuate their activities most markedly by acting upon this suggestion and increasing the number of available booths within their districts. They can thereby add greatly to the receipts normally received through outside tolls, and improve the reputation of their systems, not only among themselves and experts, as types of technical perfection, but with the outside public, as models of excellence, convenience and privacy.

Some other features of telephone booths could be touched upon relating to their construction, ventilation and lighting The question of aesthetics might be considered, and the color of the wood finish with respect to the general *ensemble* of the place in which they are installed. While not matters of vital importance, yet they deserve consideration for the reason that if ventilation is not provided for instance, a booth filled with tobacco smoke from the last user might be entered by a lady, and the telephone employed with many evidences of unpleasantness on her part. If there is no light, further discomfort might be experienced. And thus, the minor points of interest can be analyzed in succession. But this analysis is not outlined merely for the purpose of indicating the necessity for supplying adequate accessories; but to show that the booth in itself is so much of an accepted and accomplished fact that the absence of it is an evidence that a telephone system does not possess all of the necessary modern requirements demanded.

It seems that if the population is taken as a whole, in any district supplied with exchanges, that to every twenty-five, fifty or hundred of that population, as the case may be, a booth should be installed. Practical telephony is not only concerned with the operation of its mechanism; it has to solve equally weighty problems that relate to civic growth and general necessities. This unique position is one all large companies serving the public needs must assume. It is only on this basis that they can stand prepared to serve the public, and in serving them to reap the reward that comes from such good judgment.

An article on Telephone Booths will be published in the succeeding issue of this paper. Its timeliness will be well appreciated by those keeping in touch with the Independent situation, and awake to the needs of the hour.

THE NECESSITY FOR MORE STATISTICS.

IN all classes of work, the early development, maturity, and future tendencies, are best known through the aid of statistics.

In speaking of the necessity for more statistics, reference is made directly to the absence of such, in connection with certain phases of Independent work. It is absolutely necessary to keep in touch with the whole by such means, and by this is meant not only the whole, as a series of separated items, but as a cohesive, dovetailed, intelligently classified body; in fact, a unified whole, whose common interests lead them to act co-operatively, and therefore progressively.

The lines now in the hands of the Independents should be incorporated into an outline map. In this map it should be possible to find every Independent line in working operation. It is hardly necessary to touch upon the fact that this in itself would be an aid to those engaged in Independent work, sufficient to emphasize every move made to extend their territorial reach. By means of maps the entire plan of the Independents, crystallized up to date, would be thus brought to instant attention. It is strange to realize that the Bell interests already have such maps, maps which not only cover the territory and lines embraced by their own field of operations, but those of the Independents as well In other words, the strange paradox is presented of a competitor knowing more about the general and detailed aspect of a business than those actually engaged in it. An ordinary map contains all the geographical facts of a country or given location. It is, in a sense, encyclopedic in this respect. As a means of presenting data of infinite importance to the Independents, nothing would prove superior to a map. Statistics of development could then be readily traced from year to year; or if printed more frequently, a permanent record could be kept half yearly or quarterly. The idea is not only valuable in a general manner, but it is indispen-

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sible specifically. The sudden growth in one district, the sluggishness in another, would be features of interest and discussion at the regular conventions. There is a possibility that such a map would be the means of exerting a deeper competitive spirit in those engaged in contiguous territories. The results of this would be in evidence annually, when such reports come in as indicate the degree to which service has increased. The stimulation inspired by so simple a means would eventually manifest itself, not sporadically, or in a few sections of the country, but continuously in all places where Independent operations have or will find room for their activities.

Statistics, therefore, in this respect and in this form would prove a wholesome and reliable means of advancement. That which is called co-ordination would become established, not only in the way of wire networks, known best to those living in or near a given section of the country, but to all who take the time to examine and trace the telephone connections installed by Independent money and enterprise. As a basis for an incalculable amount of good, a map of such circuits will be admitted without question by those intelligently appreciative of its significance. As a basis for a train of lesser, and perhaps equally important benefits, future progress and experience in Independent work would readily show.

If peoples engaged in warfare are so armed that one side possesses and uses battleships and steel piercing guns, it seems only an act of simple logic to conclude that the other side must provide itself with fitting antidotes to such weapons of attack and defence. To spread a thoroughly American principle, among a class dominated against their wills by a power inimical to national ideas, or fair and healthy industrial progress, requires means that are serviceable as well as militant. It requires weapons of at least a similar character to win success.

If in this war now waged the map is a basis for hopes of greater expansion and better comprehensiveness, let it be made at once. And let this map of Independent work be crowded as the months roll by, with lines that show its systematic and inevitable growth, in districts now festering in the dying grasp of a reptilian monopoly.

We request our readers to carefully review the contents of the Official Bulletin Number Three of the National-Interstate Telephone Association, found on page 235 of the last issue of THE AMERICAN TELEPHONE JOURNAL. In it will be found the nature of the requirements, in the way of information wanted, on telephone lines. An immediate response to this plea will be the means of pushing the maps to a rapid consummation, and also furnish data for future reference.

Telephone Investments

THE publication, bearing the stamp of authorship of Frederick S. Dickson, president of the Cuyahoga Telephone Company, entitled "Telephone Investments and Others," is worthy of careful examination and consideration. It reviews the situation as regards telephony, from a semi-historic and comparative standpoint. It shows in a definite and comprehensive way the meaning of financial terms, for the purpose of associating them with telephone securities. It enters into the methods of human communication, leading up eventually to the telephone as a wholesome form of legitimate investment. It treats of the advance of values, of population and of competition in given localities. It discusses the magnificent equipment of the Cuyahoga Telephone Company, and by means of illustrations throws a new light upon its system and operation.

The exact nature of the assets of telephone companies, hitherto unknown, are brought to public notice. Substantial reasons for capitalization, which prove as solid as those advanced by steam or electric railway enterprises, are shown in favor of telephone companies. The great wealth buried underground, and invested in the thousands of miles of copper wire; in expensive switchboards and apparatus, all receive attention. The conclusion of this fascinating resumé will lead to an emphatic admission of the prevailing ignorance regarding such facts, and the ability of the author to present them.

We shall print extracts from the contents of Mr. Dickson's book.

Machine Noises and Cross Talk

FRANK C. LORING.

THE machine noises that get to the battery, and to the line are due to the following:

(1) Those due to the commutation of the generators.

(2) Those set up in charging leads, due to these leads being run in the neighborhood of other machines, such as ringing and service meter machines.

(3) Those set up by the influence of other coils having magnetic fields.

(4) Those due to the influence of other battery leads, that may run near or parallel to the charging leads. This condition exists at the battery where the conduits rise from the floor.

It has been found that when the charging leads run near the machine table, that the hum of the ringers and service meter machines can be clearly heard over a section of the charging lead or across the battery.

By moving the lead away from proximity to the table, no noises from these machines can be heard.

Experiments have been made to eliminate noise in the discharge leads, by making them inductively neutral. This was first tried by using conductors of about No. 19 B. & S. size of a 600 wire lead covered aerial cable. These conductors were twisted. Each of the total conductors was made up, by taking half of the twisted leads. This proved most successful, cutting out nearly all the noise. This has also been tried with concentric conductors which are likewise neutral to one another. These consist of the combination of a brass conduit for the external conductor and a copper cable for the inner.

The amount of cross talk in an exchange is proportional to the number of conversations taking place through the one battery and common leads.

With only two conversations, the cross talk between the two lines would be very great, chiefly on account of the fact that the internal resistance of the battery is greater with a small load than it is with its normal output.

The greater the number of conversations the less can the talking in one line be distinguished in the other, because the value of the talking current is more uniform, with a greater number of conversations.

The twisted pair common discharge leads already mentioned in connection with machine noises have been found to eliminate a large percentage of this cross talk.

The use of a non-magnetic conduit for the discharge leads to the coil rack fuse panel, is not considered entirely satisfactory. factory.

The following conclusions are presented:

(1) A choke coil is necessary in the charging circuit.

(2) Smaller discharge leads may possibly be used when made up with individual twisted pairs, and still have a minimum amount of cross talk.

(3) Charge and discharge leads should not be run parallel with noisy conductors, or near the machine table or other sources of magnetic disturbances.

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THE TELEPHONE IN THE COURTS

CONDUCTED BY A. H. McMILLAN.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

RATES FIXED BY FRANCHISE.

We are operating under a franchise granted to, and accepted by, a professional promoter who was interested only in his immediate gains.

Our franchise fixes the rate for service, also provides that 2 per cent. of our gross receipts shall be paid to the city annually, besides furnishing the city with fifteen free telephones. None of these burdens are imposed upon, or accepted from, our competitor.

We would like to know, first, if the city has the legal right to enforce these terms, and to what extent? What would be the best method for proceeding when we find it necessary to advance our rates. Our plan for the present consists in careful, but frank, out and out expressions, calculated to mould public sentiment, a first-class service in every way, and refusal to further extend our plant in unprofitable districts.

P. R. C.

WE doubt whether the city has any authority to enforce the terms fixed by your franchise. It is a rule of law that is becoming more generally recognized each year that, where a telephone company owes its right to carry on a telephone business to a statute of the State, a municipal corporation has no authority to interfere and attempt to regulate rates even though it does so in what is called a municipal franchise. All that the city has authority to do is to fix a route for the line through its territory and impose reasonable police regulations. The fixing of rates is not included in the police power of a municipality and where a franchise is obtained from the city by a company that already has authority from the State to engage in the telephone business, the franchise of the city is without consideration and therefore void. Macklin v. Findlay Home Telephone Company, 24 Ohio Cir. Ct. Rep., 446; New Union Telephone Company v. Marsh, 89 N. Y., 79; Joyce Electric Law, Sec. 525; State v. Toledo Home Telephone Co., 74 N. E., 162; State v. Missouri and Kansas Telephone Company, 88 S. W., 41.

ISSUANCE OF BONDS ENJOINED.

POSTMASTER P. D. BARKER of New Orleans, La., has filed a bill of complaint in the Chancery Court against the Home Telephone Company, a corporation, W. C. Polk, W. H. Bryant, Robert L. Douglass, John C. Montieth, officers of said company, and the Central Trust Company of Mobile. The orator, in his bill of complaint, says that he was holder and owner of ten shares of the preferred capital stock of the company, prior to and on July 12, 1905, at which time a meeting was held for the purpose of issuing bonds to the extent of $350,000. The bond issue was authorized through the Central Trust Company. Objecting to the issue being made by his agent, he now asks a restraining order to prevent the issuance of said bonds.

CAN TELEPHONE COMPANY LAWFULLY STRING WIRES ON PIPE LINE COMPANY'S POLES?

IN an action of the Washington Borough against the State Mutual Telephone Company of Pennsylvania, seeking the removal of the company's wires, poles, etc., from the streets of the borough, the defendant company has filed an answer to the allegations of the plaintiff's bill. After setting forth admissions of facts not disputed, the defendant further answering, says:

That on all streets and alleys of said Borough of Washington traversed by the wires of the State Mutual Telephone Company between the points in question in the suit, the wires are strung on poles belonging to the Southwest Pennsylvania Pipe Lines, a corporation, duly organized under the laws of Pennsylvania; that said poles had been lawfully erected under competent authority. The wires of the State Mutual Telephone Company do not traverse any streets or alleys of the borough, on which poles had not already been erected and wires strung at the time of the stringing of the wires of the State Mutual Telephone Company.

The defendants therefore aver than under the provisions of the Act of Assembly of March 19, A. D. 1903, P. L. 34, the State Mutual Telephone Company had a right to string its wires on the poles of the Southwest Pennsylvania Pipe Lines, along the streets and alleys of said borough, under authority from the Southwest Pennsylvania Pipe Lines, without obtaining the consent of the Borough of Washington so to do.

The defendants respectfully pray that the plaintiff's bill be dismissed and that they be hence discharged with their reasonable costs.

ANOTHER DECISION AGAINST $1 POLE TAX.

JUDGE BISHOP, in the Circuit Court at Geneva, Ill., has ruled against the city of Elgin in its case against the Chicago Telephone Company for a tax of $1 for each telephone in service in that city belonging to the Chicago Telephone Company, sustaining a demurrer by the company.

AGREEMENT TO LESSEN POLES A PUBLIC BENEFACTION.

THE injunction suit of the city of Hamilton against the Hamilton Gas and Electric Light Company and the Home Telephone Company has been decided against the city by Judge Belden. The suit was brought to restrain the electric light company from stringing wires on Fifth street on the poles of the Home Telephone Company, but the court held that an agreement between the two companies, which lessened the number of unsightly poles erected on the streets, was a public benefaction instead of an injury to the city. As to the rescinding of the ordinance passed a number of years ago, giving the electric light and gas company the right to all the streets and alleys in the city, the court held that there had been no evidence submitted to show that the gas company had agreed to the waiving of its original rights, as provided in the first ordinance passed by the council. The injunction was therefore dissolved and the case dismissed at the city's cost.

INDEPENDENTS MAY USE "BRIDGE BELL."

A DECISION of the Pennsylvania Court of Appeals has marked what telephone interests say will probably be the passing of the last of the patents which were controlled by the Bell Company exclusively, thus giving the Independent companies an equal chance with the Bell in all fields. The case was known as the Carty patent suit, which involved the right to use the "bridge bell" system used on party lines. The suit was decided in favor of the independents more than one year ago. An appeal was taken by the Bell interests and this was delayed and a second hearing made necessary by the death of one of the judges, the other two failing to agree. The last decision, which was favorable to the Independent companies, was anticipated by them, and they have been using the party line system for some time.

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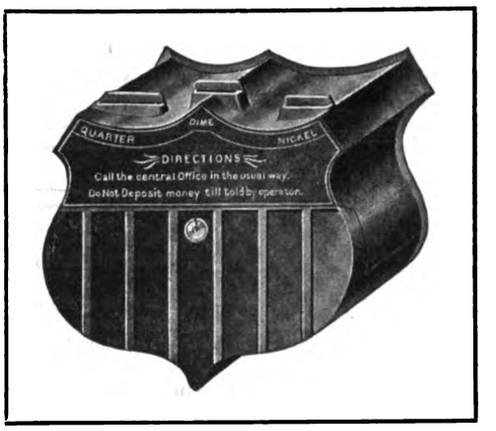
GRAY PAY STATIONS PAY GRAY



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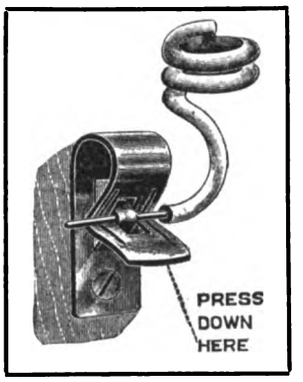

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QUERIES

GENERAL QUERIES.—(609.)

Kindly answer the following questions:

1. Where can I get a book or books giving up-to-date Bell switchboard circuits?

2. What chemical action takes place in a storage battery during charge and discharge? Give chemical symbols for this action.

3. Describe fully the method of making the Varley loop test with a Wheatstone bridge. M. B. H.

1. The latest book giving up-to-date Bell circuits is Kempster B. Miller's "American Telephone Practice," Fourth Edition. Bell multiple switchboard circuits, toll board circuits, testing circuits and telephone circuits are illustrated and described. There are no books published giving all of the present Bell circuits. Most of this information is so carefully guarded by the Bell company that only a few of its favored employees have access to it.

2. The exact nature of the chemical changes which occur in lead storage batteries is not yet fully established, authorities differing greatly on even the most important items. One authority gives the following reaction, Fig. 609a, for the charge and discharge of a storage battery. According to this equation the active material on both plates is converted into lead sulphate when the battery is discharged.

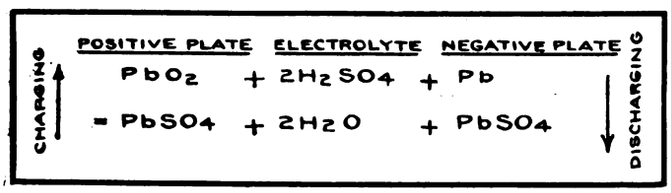

Fig. 609a.

3. In making the Varley loop test on the Wheatstone's bridge the connections shown in Fig. 609b should be made. The line to be tested is looped with another line which is good by joining at their distant ends. The battery is connected from the point *C* of the bridge to ground. Then the rheostat arm of the bridge contains the resistance *R*, unplugged in the bridge, plus the resistance *X* of the bad wire to the fault *F*, while the unknown arm contains the resistance *Z* of the good wire, plus the resistance *Y* of the bad wire on the other side of the fault. The balanced bridge is then represented by the following equation:

$$\frac{A}{B} = \frac{R+X}{Z+Y} \quad (1).$$

Now letting *L* represent the resistance of the loop consisting of the good and bad wires:

$$L = X + Y + Z,$$
$$\text{or } Z + Y = L - X \quad (2)$$

Substituting in equation (1)

$$\frac{A}{B} = \frac{R+X}{L-X} \quad (3),$$

or resistance of bad wire to the fault

$$X = \frac{AL - BR}{A+B} \quad (4).$$

When the two ratio arms of the bridge have equal values A = B, then resistance of bad wire to the fault:

$$X = \frac{L-R}{2} \quad (5).$$

From the foregoing it can be seen that the result is entirely independent of the resistance of the fault or of any earth connections from *G* through the battery to *F*. Thus any varying of the resistance of the fault while the test is being made will not affect the result.

If the bad wire is crossed with other wires then the battery should be connected to the wire with which the bad wire is crossed instead of being grounded, as shown in Fig. 609c.

The resistance *L* of the bad and good wires may be known from records previously made or if only one ground is present on the bad wire it can be measured directly on the bridge. This resistance can be also computed from the size and length of the wire by reference to wire tables.

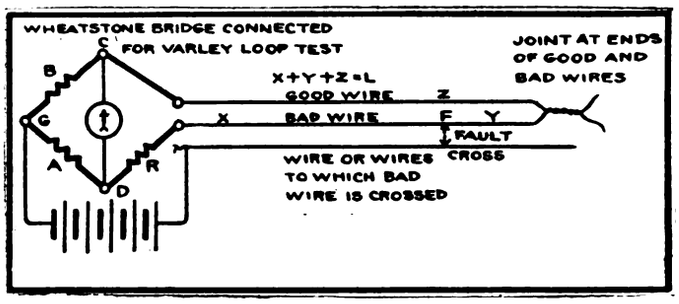

Fig. 609b.

The distance to the fault may readily be obtained from *X*, the resistance of the bad wire to this point, and wire tables giving resistance per foot of the conductor.

PROTECTION ON TROLLEY LINE.—(610.)

I am contemplating building a telephone line, using the poles of the electric railway for six miles. I have in view the use of No. 14 copper wire as the poles don't span over 110 feet and lots of them are not more than fifty to sixty feet apart. It appears to me that No. 14 copper is better than No. 12 iron on account of lower resistance. Am I correct? Also will I secure ample protection by using sneak coils and fuses similar to those of the Central Electric Company if the line should get crossed with the 500 volt trolley circuit. Is there any liability to injury to the operator or destruction of the board with this construction? J. L. P.

The matter of choosing between iron and copper line wire is a question of high first cost and long life of copper as compared with low first cost and short life of iron—for a circuit only six miles in length.

A trolley line is not a safe place for a telephone line, generally speaking, and is a location to be avoided for a circuit handling commercial business. When such a location is necessary the protection should consist of fuses, lightning arrest and heat coils, with a repeating coil cut in between the protection and the switchboard. The repeating coil should be capable of withstanding at least 1,000 volts between the primary and the secondary and between both primary and secondary and the ground, or mounting of the coil.

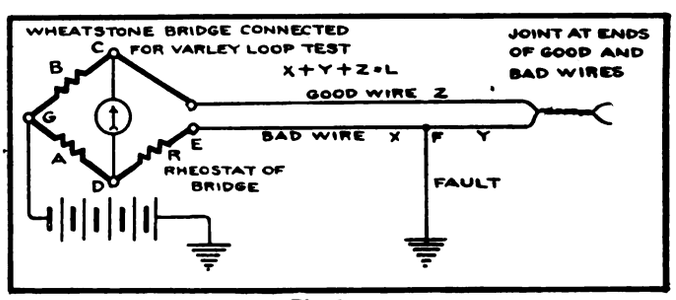

Fig. 609c.

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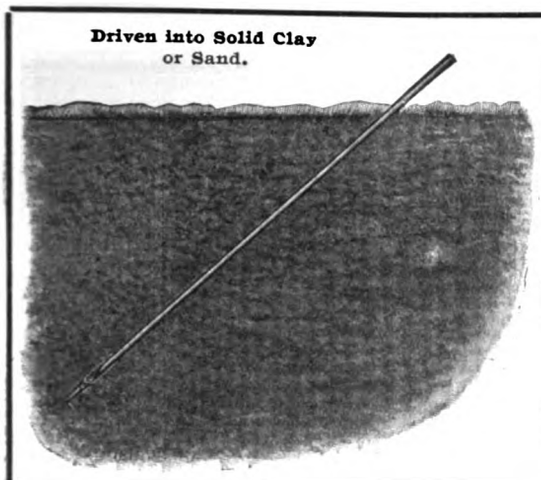

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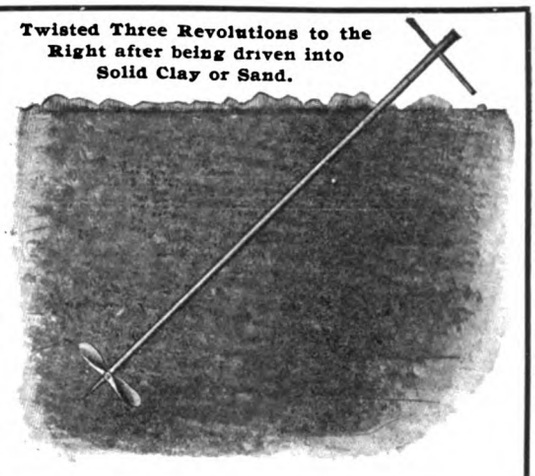

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WANTED—As traveling inspectors, 4 men of good appearance and address who have had general telephone experience. Application must be made in your own handwriting, giving history of your past experience and ample references. State salary expected. Address Geo. J. Yundt, Engineer, Southern Bell Telephone and Telegraph Company, Atlanta, Ga. 467

WANTED—Position by married man, 33 years old, 12 years' experience. Competent to take charge of construction or maintenance. Can test for cable faults and splice cable. Address Box 468, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 468

WANTED—Position as manager or superintendent by good, all around telephonist. Seven years' experience. Hustler, strictly temperate, familiar with manual and Strowger automatic system. Age 26, married. Address Box 474, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 474

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WANTED—Position as manager or wire chief. Eight years' experience installing, engineering, maintaining and managing telephone plants. Married. Best of references furnished. West preferred. Address Box 475, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 475

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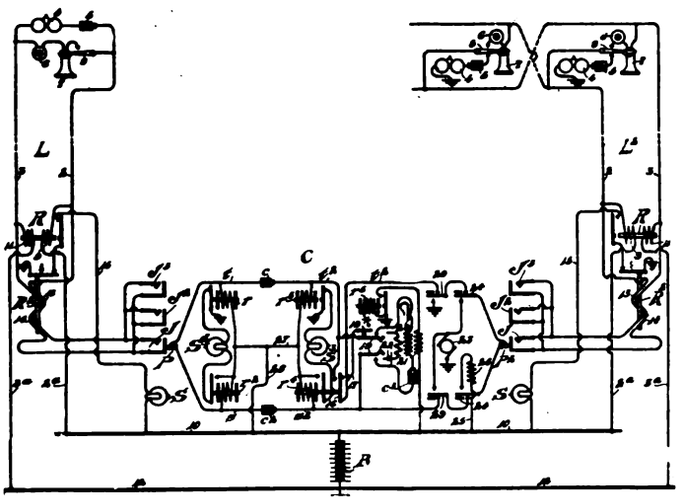
TELEPHONE PATENTS

TELEPHONE SYSTEM.

William W. Dean, of Chicago, Ill., patents (No. 794,349; dated July 11, 1905; filed September 14, 1903; serial No. 173,023; and assigned by mesne assignments to Kellogg Switchboard and Supply Co., of Chicago, Ill.) a telephone system.

This invention relates to improvements in telephone systems, with special reference to the class known as "two-wire." The leading purposes of the invention are to eliminate cut-off relay contacts from the talking-circuit of the line, also to remove cut-off relays from the path of the current when the subscriber is calling the central office. A further purpose is the development of a system whereby the lines become "clickless," by preserving



the normal connections of the battery with the lines. In this system the ringing current can be sent out over either side of the lines and the cut-off relays actuated without special devices. A relay is also provided in the line circuit which does not impede currents in the metallic line.

A cut-off relay with two differential windings is employed as shown at R^3. One is provided for each line between the line relay R and connection terminals. The relay has windings *13* and *14* included in the line conductors *2* and *3* respectively. In the claims, the use of a differentially wound relay is emphasized in conjunction with the various other elements of the system. The superposed windings of the relay are neutral to rapidly varying voice currents in the metallic lines. The cut-off magnet R^3 operative when a connection with the line is established, renders the line signal inoperative.

SWITCHBOARD.

Joseph L. Wright, of Cleveland, O., patents (No. 798,123; dated August 29, 1905; filed July 28, 1904; serial No. 218,509); a telephone switchboard.

The object of this invention is a switchboard wherein conductors connecting the plugs is avoided. Instead of plugs and cords connections terminate in rows of connecting strips made up in pairs. Pairs of plugs more the sliding line jacks. The plugs have heads on the inner end, which catch springs on the outer ends of the jacks to restore them to normal position when the plugs are withdrawn.

PHOTOPHONE.

Raimund Wilhelm Hartmann, deceased, of Berlin, patented (No. 796,254; dated Aug. 1, 1905; filed Sept. 15, 1904; serial No. 224,549, which was assigned by the Administrator Bruno Svenger, of Berlin, by mesne assignments to Franz Arnold, of Deggendorf, Germany) a photophone.

In this invention the dispersion of light is limited in operation by means of an elliptic mirror, a correctly situated aperature in a plane mirror, a source of light at the focal point and a telephone receiver. The selenium cell in conjunction, supplies the necessary element sensitive to the light variations in transmission.

CUT OUT FOR TELEPHONES AND CIRCUITS.

Charles Adams-Randall, of New York, N. Y., patents (No. 798,555; dated Aug. 29, 1905; filed Sept. 17, 1904; serial No. 224,825); a switch or cut out for telephones and circuits.

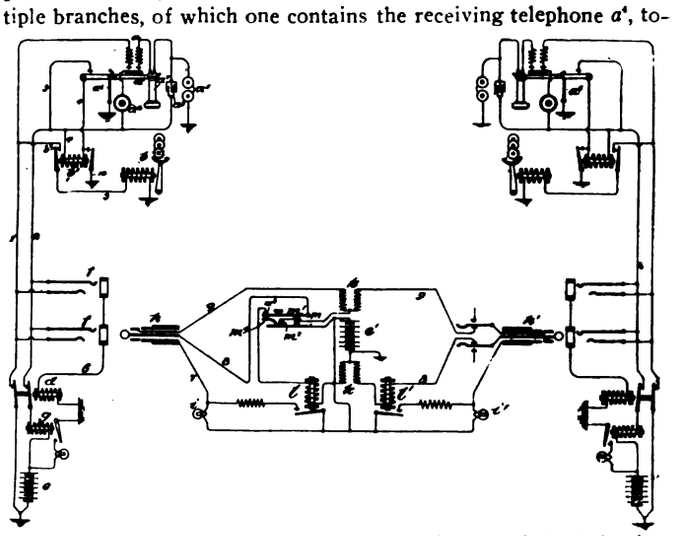
By this device noises and side tones are prevented when telephoning is done over long circuits, and when power transmitters are conjunctively employed.

METER FOR TELEPHONE LINES.

Charles E. Scribner and James L. McQuarrie patent (No. 794,125; dated July 4, 1905; filed July 16, 1900; serial No. 23,730, and assigned by mesne assignments to Western Electric Company, of Chicago, Ill.); a service meter for telephone lines.

This invention concerns the arrangement and operation of service meters at sub-stations of telephone lines designed to register at each station the connections initiated at the station, its object being to so adapt the meter and its circuit connections to the signaling and telephonic appliances of the system as to free the meter from all interference by signaling or telephonic currents in the system.

In the sketch line conductor 1 leads through a winding of the telephone induction coil a to a normally open contact at the telephone switch a^1, and the other line conductor 2 leads through multiple branches, of which one contains the receiving telephone a^4, to-



gether with a condenser a^5 and the other winding of the induction coil a, and the other of which includes the transmitting telephone a^2 to terminate in other normally open contacts of the telephone switch, which become closed together and with the first mentioned contact while the telephone is in use. In employing the service meter b in conjunction with the apparatus at the sub-station, the actuating magnet of the meter is connected in a local ground branch 3 from line conductor 1, which branch is controlled by the switch contacts b^3 of a relay b^1. At the termination of a conversation, the service meter is brought into connection with the line conductor 1 in ground circuit, where it may be controlled by any suitable appliance at central to register the use of the line.

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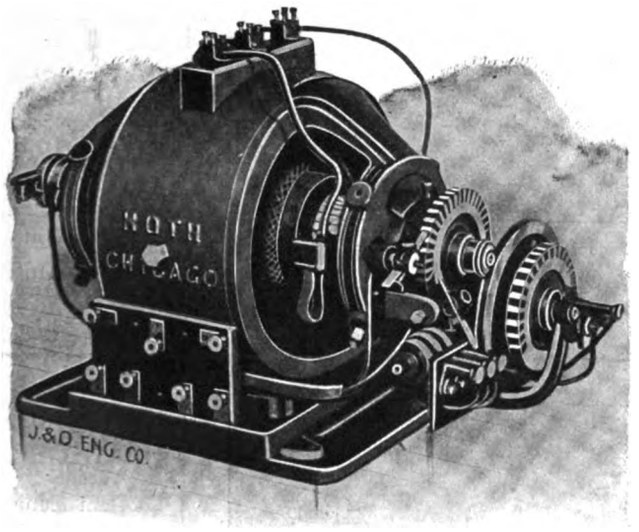

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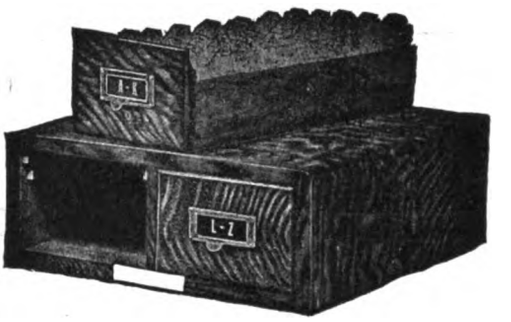

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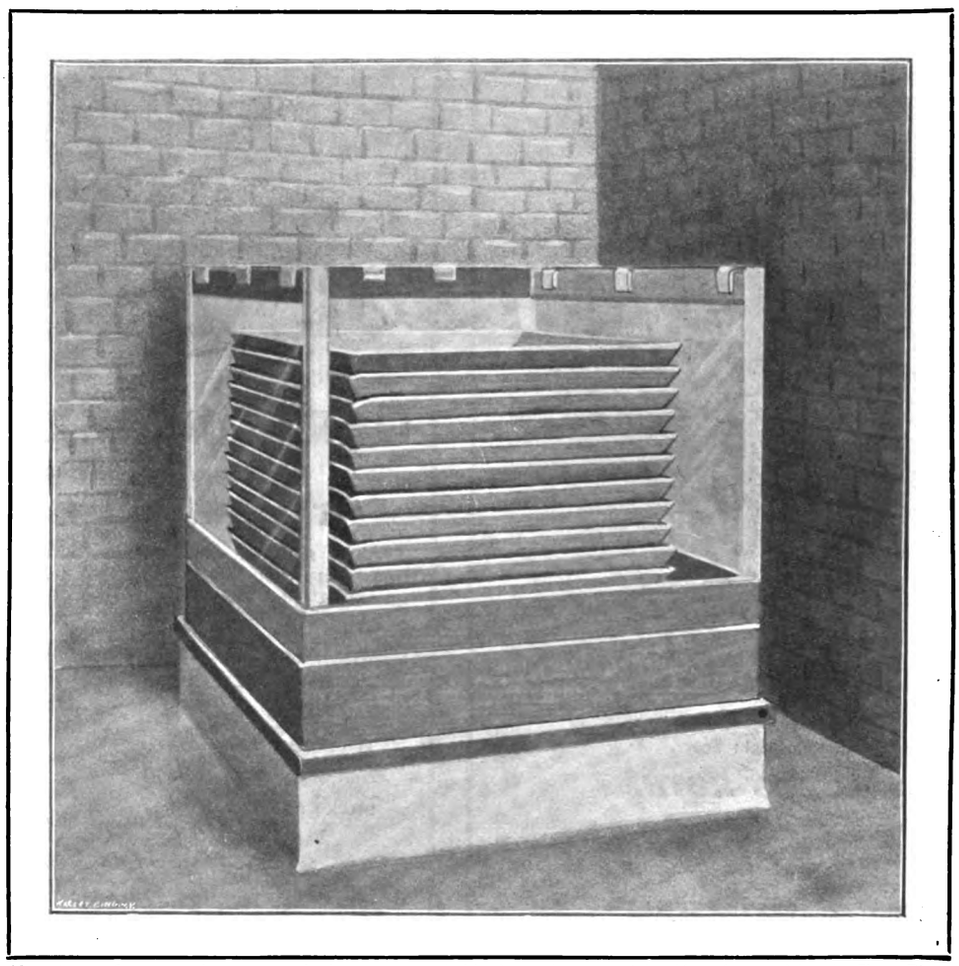
A TRAY PLATE STORAGE BATTERY.

STORAGE battery design includes considerations of electrical and mechanical properties which are well established and understood. Originality in construction therefore must be along lines which will be improvements over the accepted cell form. Unique in this respect is the Tray type battery manufactured by the Tray Plate Battery Company, of Binghamton, N. Y., and which is illustrated herewith. The plates are placed horizontally instead of vertically, and are designed with the both elements mounted on the plate. As the negative material will not fall off it is placed on the under side and the positive active material is placed in the bottom of the tray and therefore cannot fall out of its containing grid.



New type of storage battery employing trays to hold the active materials. Manufactured by the Tray Plate Battery Co., Binghamton, N. Y.

This, the manufacturers claim, is an important feature, as in the ordinary cell type, where the plates are vertical, there is nothing to prevent the positive active material from falling from the grids and dropping to the bottom of the cell, where it in course of time will short circuit the cell unless frequently cleaned out. This also reduces the capacity of the battery in proportion to the amount of active material falling from the grids.

It is also claimed that the Tray Plate battery can be short-circuited any number of times and the plates will not buckle, and that electrolysis is entirely eliminated in the Tray battery.

Special attention is drawn to the absence of noxious odors or corrosive fumes from this type of battery.

It occupies a smaller space than that required for the cell design, and it is claimed has from 10 to 15% greater efficiency. The manufacturers will be pleased to furnish further details upon request.

THE STROMBERG-CARLSON TEL. MFG. CO., Rochester, N. Y., reports having closed contracts for switchboards for the following places: Marathon, Wis.; Rose Hill, N. Y.; Tatson, Mo.; Tolo, Oregon; Niagara Falls South, Ont., Can.

NEW VOUGHT-BERGER EXPRESS DROP.

A NEW express drop, with outwardly falling shutter, has recently been brought out by the Vought-Berger Company of La Crosse, Wisconsin.

In this device all the requirements of a first-class express drop were considered during its development. The drops are mounted individually and in as compact a form as possible, occupying a space of only 1" x 1¼", including the mounting frame. The frame and springs are built up in a rigid manner which insures absolute unchangeability in the adjustment. The restoring device, which is operated by a coiled spring, has so wide a margin that there is no possibility of its getting out of adjustment, either from rough handling or from wear.

Another important feature is the accessibility for repairs, and the fact that there is no change in the magnetic adjustment when repairs are made. The core is riveted to the shell and the coil is wound on a fiber tube which slips loosely over the core, but which is held from turning by a pin in the end of the shell. All talking connections are soldered, as this is the only sure connection for talking circuits. The connections from the jack springs to the coil terminals, are made by means of a swinging arm, which is attached to the jack springs by a rivet and spring washer, which hold the coil terminals in a spring clamp. This makes a sure connection for operating the drop and also permits ready disconnection of the coil terminals.

The saddle which carries the armature is held to the shell of the drop by strong bayonet catches, so that the armature may be removed by pulling it straight back and it can be readily replaced by slipping the prongs of the saddle into the bayonet catches. This method of construction insures an unchangeable magnetic circuit for the drop.

The Vought-Berger Company has some very interesting descriptive matter relative to this new drop which it will be pleased to send in answer to inquiries. It will also send a complete catalogue of its telephones and switchboards to parties interested.

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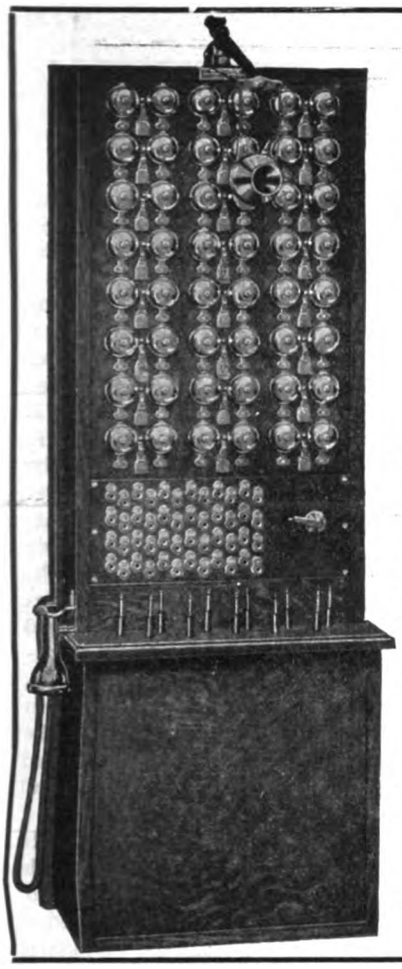

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SIMPLEX RELAY SWITCHBOARD

Especially for

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A good board is a pride to an Exchange. When it is simple and efficient in operation, its price becomes a secondary matter. Let us prove to you that it is what you want. Will tell you all about it, if you let us.

The Williams Telephone & Supply Co.

59 Central Ave. Cleveland, Ohio

TELEPHONE TROUBLES

STANDARD W. U. TEST SET.
(Circular 500A)

We have a well-organized factory and trained staff whose principal business it is to keep telephone men and telephone systems out of "trouble." We never fail where people are willing to be helped. We help all along the line—our instruments and methods test the copper for conductivity and the sheathing for insulation before the cable leaves the factory; Willyoung instruments test the receiver magnets and coils, the "drop" resistances, the condenser capacities, etc. If anything goes wrong during installation we tell you just where it is; if anything ever gives out on the completed system we tell you where *that* is.

CAN YOU AFFORD TO DO WITHOUT US?

We make Test Sets, Ohmmeters, Fault Locaters of all kinds, Galvanometers, Faradmeters, Electrometers, in short, everything in the Test Instrument Line for either portable or laboratory use; special instruments for any purpose from our own or customer's designs.

Our Catalog Matter is a Liberal Education.

ADDRESS TELEPHONE DEPARTMENT

THE WILLYOUNG & GIBSON CO.

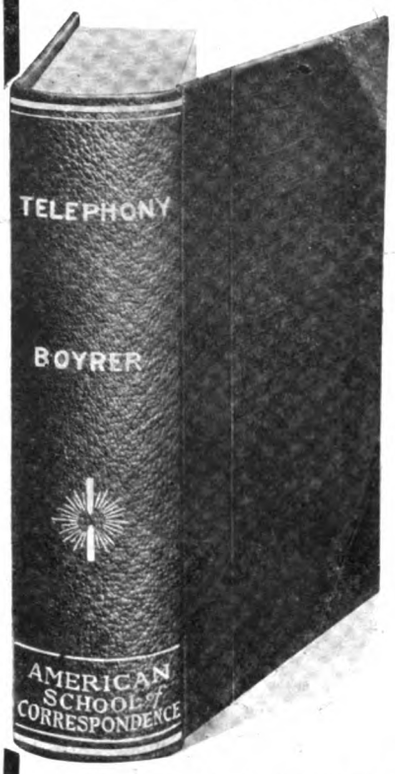
38 West 13th Street, New York City

We want to sell you our book on

TELEPHONY

because we know it will be worth to you, as a reference work alone, ten times its cost.

It was written by William C. Boyrer, M.E., M.M.E., formerly Division Engineer of the N. Y. and N. J. Telephone Co., universally recognized as a man of wide practical experience. This work contains 432 pages and has an illustration on every page, with few exceptions. The binding is durable and beautiful. Special articles were written for this work by Kempster B. Miller, A. Frederick Collins, Samuel G. McMeen and H. S. Durant.



Here is a condensed list of the subjects treated:

Telephone Instruments.
Telephone Lines.
Telephone Exchanges.
Common Battery Systems.
Telephone Operation.
Telephone Maintenance.
Automatic Telephone.
Wireless Telephony.
Telephone Line Protection.
Quality of Telephone Service.
Automatic vs. Manual Exchanges.

Regular price $6.00. Special price to readers of the American Telephone Journal

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Express prepaid. Money refunded if not satisfactory.

At the end of the book will be found a very complete index and also a large number of "Review Questions" for at-home students.

We have spared no expense in the preparation of this book. It is only fair to tell you that it is a compilation of the matter contained in the instruction papers used in the telephone course of our school. This will explain why you can buy it at such a low price. Otherwise it would cost you more than twice this sum.

Inasmuch as a comparatively small edition was printed, we advise that you send us your order within the next few days. Guarantee against missing this proposition by cutting out this coupon and enclosing the money to us now.

IMPORTANT If the book is not all we claim for it and not satisfactory to you in every particular, your money will be cheerfully refunded.

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American School of Correspondence, Chicago.

Inclosed please find { money order / check / cash } for $4.00 for which please send me, express prepaid, your book on "Telephony." If not satisfactory, after five days examination, money will be refunded.

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AMERICAN TELEPHONE JOURNAL, Oct. 7, 1905.

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A NEW RINGER DESIGN.

IN the design of the substation set, the generally accepted principle is to reduce space and make the apparatus as compact as possible. An entirely new principle in the design of a ringer for common battery operation has been worked out by Charles E. Egan, and permits a marked reduction in size of the compact type telephone. In the accompanying illustration Fig. 1 shows an instrument, Fig 2 the circuit, and Fig. 3 the assembled hook and ringer. The novelty of the apparatus is centred in the ringer design, which is radically different from any other.

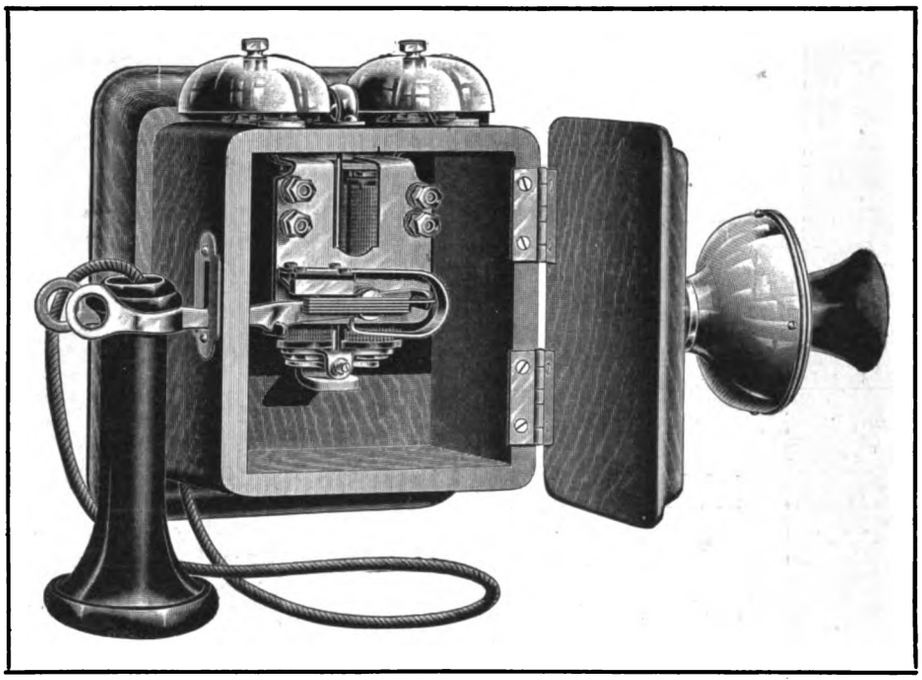

Fig. 1.—The Egan Compact Telephone, showing arrangement of mechanism.

The ringer has very long cores, one of which carries the winding, and the other carries a rolled condenser of peculiar construction, the material and method employed being held a secret by Mr. Egan. This condenser has a very high capacity for its size,

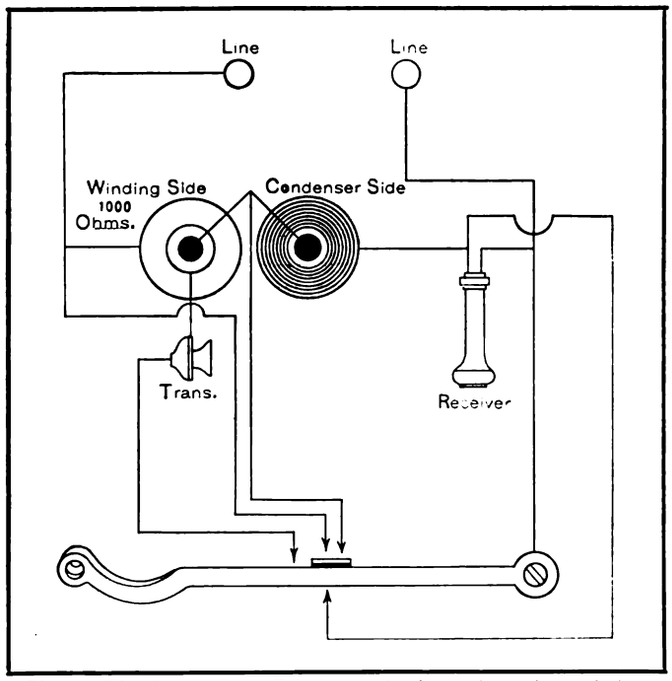

Fig. 2.—Circuits of Egan Telephone, showing unique ringer design.

and when the usual binder's cloth and other covering is applied the two spools of the ringer are not noticeably different from the windings in an ordinary instrument. Thus the condenser is combined with the ringer itself, and as will be noted from the diagram the winding side of the ringer is also employed as the impedance coil. In winding this coil, which may be of any desired resistance up to 1000 ohms or more, the wire is laid on until 35 or 40 ohms have been wound, when a double end or loop is brought out, and the further winding proceeded with. This loop is then connected in the transmitter circuit. The ringer yoke carries a plate which drops down in front of the spools and carries a self-contained long lever switch-hook, the lever being removable so as to permit the set to be shipped in a very small case.

Referring to the diagram, it will be seen that the circuit is designed so as to be usable with any of the standard common battery line and switchboard circuits. The battery supply is from the line post to the outside of the ringer winding, to the tap to the transmitter, to the switch-hook, and so back to line.

The receiver and the condenser side of the ringer are connected in shunt around a portion of the ringer winding when the hook is up, and in series with the whole winding at other times. When the hook is down a short circuit is established about the receiver in order to prevent ringing current from passing through it. Fig. 2 shows the box open, exposing the working parts which are all mounted as a complete unit upon one frame, shown in Fig. 3 as removed from the box. This structure includes the ringer, condenser, switch-hook and impedance coil, and in its preferred form also includes mountings for the gong posts. In the cut these are shown secured to the outside of the box. The wiring of this set is very simple, and the mechanical construction is excellent, as all the parts are of standard construction.

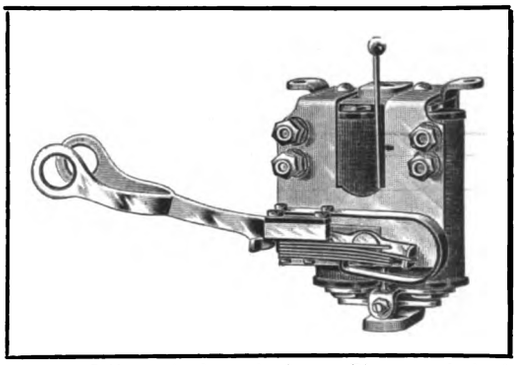

Fig. 3.—Self-contained mechanism. Ringer and hook mounted on one frame.

This apparatus is manufactured by the Egan Electric and Telephone Manufacturing Company, of Petersburg, Ill., who will be pleased to furnish further particulars upon request.

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SUMTER

SOLD ON QUALITY—NOT ON PRICE

SOME PEOPLE THINK

that because Sumter apparatus is so much better than others its initial cost is too great for them.

Such is not the case. Large production has enabled us to reduce the individual profit on each telephone to a minimum. It should always be borne in mind that it is the maintenance expenses of a telephone line that reduce revenue and fathers cuss words. "SUMTER QUALITY" is more than simply a phrase. You had better get some and see.

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TELEPHONES, SWITCHBOARDS

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The Supply House that Helps You

We are in business to make money. We know there is one best way to do it. That is to help our customers.

We cannot afford to be mercenary. Our customers' interests are ours. Our aim is to give you the best at the lowest price—to save you money.

We are also glad to help you select your equipment and give you suggestions gained by our experience.

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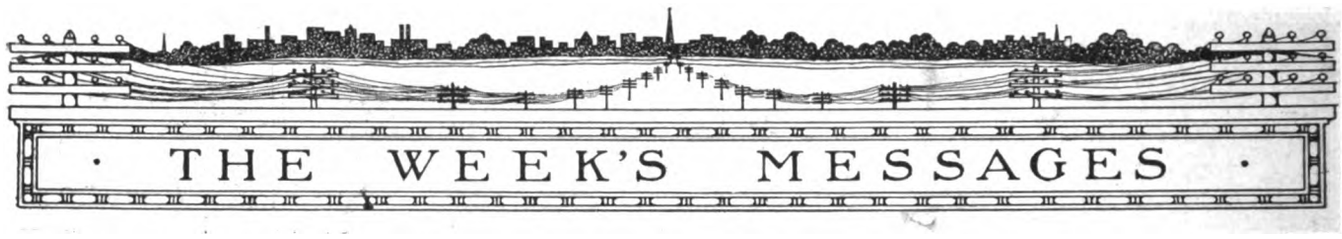

FINANCIAL.

SAN FRANCISCO, CAL.—A mortgage for $1,920,000 from the Philippine Telephone and Telegraph corporation to the Union Trust Company of San Francisco has been filed to secure a bonded indebtedness. The transaction covers the project of installing a telephone system in the Philippines.

QUINCY, ILL.—The Quincy Telephone Company, of Quincy, Ill., which procured its franchise about a year ago, has sold its $500,000 issue of bonds to a St. Louis syndicate, which includes J. H. Murphy and Charles Sutter. The work of construction will begin immediately, and it is expected to be completed by next April. Long distance connections will be made with St. Louis and Chicago, and about 5,000 telephones will be installed.

MANILLA, IA.—The Manilla Telephone Company has increased its capital stock to $25,000.

PARKERSBURG, IA.—The Parkersburg Telephone Company has increased its capital stock to $10,000.

FAIRBURY, NEB.—The Fairbury Telephone Company has increased its capital stock from $30,000 to $50,000, and will make some important extensions and improvements.

TRENTON, N. J.—The Interstate Telephone Company is to be reorganized. The company has outstanding bonds of $1,913,000; bonds sold and to be issued, $400,000; interest due and floating debt, $200,000; total bonds and debt, $2,513,000. It is proposed to issue $1,000,000 5 per cent. first mortgage bonds; $4,000,000 general mortgage bonds and $600,000 in stock.

ROCHESTER, N. Y.—The directors of the Stromberg-Carlson Telephone Manufacturing Company have declared the regular quarterly dividends of 2½ per cent. on the common stock and 1¾ per cent. on the preferred.

TOLEDO, OHIO.—The directors of the Toledo Home Telephone Company, at a recent meeting last week, decided to increase the wages of all its operators about 10 per cent. The increase was entirely voluntary and is greatly appreciated by the employes. The directors also declared the customary 1 per cent. quarterly dividend.

ADA, MINN.—The Rural Telephone Association of Ada has filed an application to build and operate a telephone system in Ada and the surrounding country, and between adjoining towns. President, I. M. Clark; I. N. Bozek, secretary and B. F. Grace, treasurer.

FRANCHISES.

DOYLESTOWN, PA.—The Keystone Telephone Company, of Philadelphia, has applied for a franchise to build and maintain a telephone system in Doylestown.

NEW YORK, N. Y.—The Star Telephone Company, Richard J. White, president, home office, New York City, capital $1,000,000, has applied for a charter in New York City.

COMBINATIONS.

LONG BEACH, CAL.—Some twelve to fifteen Independent telephone companies in Southern California will be consolidated into one large concern, with W. L. Porterfield, president and general manager of the Home Telephone Company, of Long Beach, Cal., as president and general manager.

ARDMORE, I. T.—The Sulphur Telephone System has been sold by C. J. Webster and J. D. Kirby, to W. N. Hayes, of Norman, Okla., and J. F. Rumley, of Chicago. The new owners will make extensive improvements.

MARION, IND.—Four Independent telephone companies of Northern Indiana have formed an organization at Marion, namely, the Converse Company, of Converse, the Wingate Company of Wingate, the Delaware & Madison Company of Muncie, and the Fort Wayne Telephone Company of Fort Wayne. Officers elected: President, Thomas Bromley, Jr., Muncie; vice-president, L. T. Barger, Converse; secretary-treasurer, O. L. Barger, Converse. The new company will ask for a franchise at Marion and establish a plant there.

PADUCAH, KY.—The Peoples' Independent Telephone Company has been sold to the Paducah Home Telephone Company.

ALBERT LEA, MINN.—The Albert Lea Telephone Company has been sold to the Northwestern Telephone Exchange Company. The new owners w... put $20,000 in improvements at once.

ELECTIONS.

VALLEJO, CAL.—The Vallejo Township Telephone Company has elected the following officers: President, J. H. Caltoft; vice-president, Wm. Risk; secretary, J. R. Peters; treasurer, F. Whitlatch.

DUNLAP, ILL.—The Dunlap & Alta Telephone Company has elected the following officers: President, Dr. Walter Allen; secretary and treasurer, W. D. Chas. Threshie. Directors: Jos. Robinson, Austin Shaw and Chas. Holmes.

LITCHFIELD, ILL.—At the annual election of the People's Mutual Telephone Company the following were elected directors of the company for a term of three years: A. G. Butler, Geo. Rainey and August Kellinberger.

LAFAYETTE, IND.—The LaFayette Telephone Company has elected the following officers: William Folckemer, president; William Horn, vice-president; H. A. Taylor, treasurer; O. P. Friberg, secretary.

HANNIBAL, MO.—The Bluff City Telephone Company has elected the following officers: President, J. F. Davidson; vice-president, T. G. Dulong; treasurer, J. P. Hinton; secretary and general manager, H. G. Conger.

BORDENTOWN, N. J.—The Bordentown Telephone & Telegraph Company has elected the following directors: J. P. Hutchinson, Fred G. Wiese, John Enright, Barker Gummere, Jr., H. R. Schwartz, F. A. Demarest, William S. Hancock.

NEW COMPANIES.

FOWLER, CAL.—The Fowler Telephone Company has been incorporated. R. B. Reid, superintendent.

GREELEY, COL.—The Northern Telephone Company has been incorporated with a capital of $250,000. President, C. H. Ramsay; C. V. Callahan, first vice-president; Dr. H. C. Bennett, second vice-president; S. H. Southard, secretary and treasurer.

LEWISTON, IDAHO.—The Home Telephone Company has been incorporated with a capital stock of $50,000. It will spend $30,000 in the installation of its new system. C. F. Osmers, of Lewiston, is president of the company, and E. L. Alford, of Lewiston, secretary and treasurer.

TOWER HILL, ILL.—A Mutual Telephone Company was organized at Tower Hill recently with the following officers: E. G. Foster, president; A. C. Jackson, vice-president; J. C. Pitzer, secretary and treasurer; L. B. Fluckey, manager.

FLORA, IND.—The Mutual Telephone Company has been incorporated with a capital stock of $5,000, the incorporators being: H. E. Soeshe, H. E. Studebaker, James Studebaker.

BADGER, IA.—The Badger Telephone Company has filed articles of incorporation. Capital stock, $10,000. Incorporators: H. E. Myhre, P. J. Folvag, C. J. Hogue, Aven Johnson, P. R. Peterson, J. G. Larson, A. N. Hogue and others.

NUMA, IA.—The Numa Mutual Telephone Company has been incorporated with a capital stock of $1,500. President, J. B. Parkard; vice-president, U. L. Hurt; secretary, J. B. Rick.

TRAER, IA.—The Traer Mutual Telephone Company has been organized and will at once take up the matter of installing an exchange.

DRESDEN, KAN.—The Dresden Telephone Company has been incorporated with a capital stock of $4,000.

NEWS—WANTED

THE matter contained upon the Message and Operating Field pages of this paper is contributed largely by our special correspondents. We believe, however, that there are many valuable items of telephonic interest which are never brought to the attention of the public. There is no reason why this condition should exist, and the Editor, therefore, invites all telephone companies, and the officials of such companies, to furnish any information that they can consistently make public relative to financial statistics, new construction, elections, franchises and personal items.

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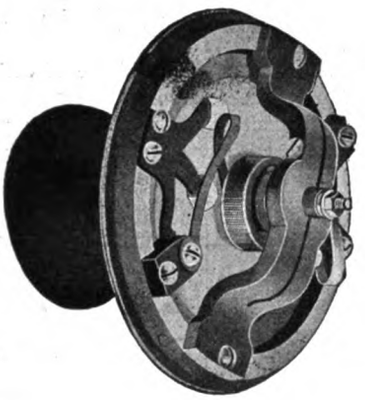
CENTURY

100 % GOOD



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is the only reliable and efficient transmitter.

This transmitter will give you perfect service and will outlast any other.

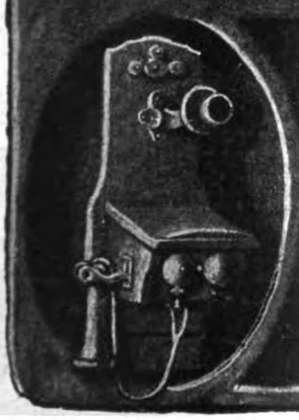
It will give exactly the same service after ten years' use as when first installed.

It is entirely free from all troubles found in carbon electrode transmitters.

It never needs any attention; consequently will reduce your maintenance considerably.

It transmits the voice perfectly with all its original qualities. It is not harsh, nor has it any metallic tones. It will never pack.

You can prove the above by a thorough test, which can be made without any expense to yourself. We will send you a sample prepaid. In sending for sample advise whether for common or local battery.



CENTURY TELEPHONE CONSTRUCTION CO.

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BUFFALO, N.Y.

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MONARCH SWITCHBOARDS

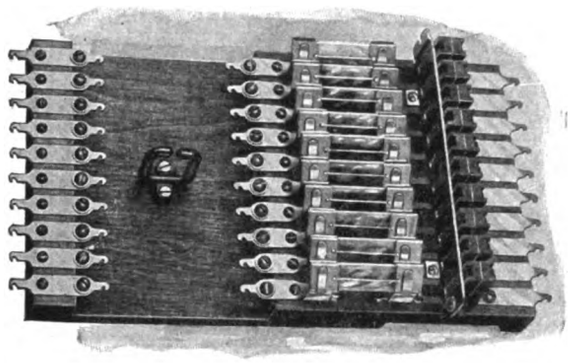
ARRESTER BOARD

A simple, convenient equipment for magneto exchanges.

Put up in sections of five metallic lines, each to correspond to drop and jack sections of the switchboard.

All connectors, carbon holders, etc., are made of heavy brass.

The fuse clips are of a new design. The clips holding the fuses may be bent if they become loose. A perfect contact is always insured.



The fuses are set at an angle. A blown fuse can be seen at a glance and a new one inserted without difficulty.

The ground strip is a broad piece of brass with a slot at one end and a screw at the other for connecting to other sections.

A slight pressure is on the carbons at all times. Perfect ground connections are thus provided.

The cross-connecting terminals are provided with both screw and solder connectors.

An insulated ring is mounted in the middle of each section for the accommodation of the jumper wires.

Substantial construction and good workmanship are apparent.

This arrester board and all other Monarch switchboard apparatus are fully described in the new catalogue. A copy will be mailed upon request.

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DOUBLEDAY-HILL ELECTRIC CO.

MANUFACTURERS AND DEALERS

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Highest Grade Lowest Prices Qickest Delivery

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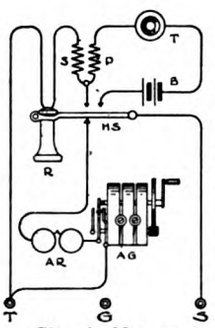
DEAN TELEPHONE APPARATUS

Magneto Telephone Circuits

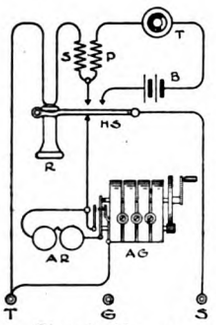


Circuit No. 40

We can furnish our magneto telephones wired for all kinds of regular and special service. The accompanying diagrams show some of these circuits, all of which are so designed as to give the best possible results with the minimum chances for trouble.

Circuit No. 40—Our Standard Series Telephone Wiring. The generator armature is normally shunted by a platinum pointed contact spring which opens when the crank is turned—a most reliable construction.

Circuit No. 30—Our Standard Bridging Telephone Wiring. This is the same circuit as No. 40 excepting that an extra platinum pointed shunt spring is provided for short circuiting the ringer when the crank is turned. The generator armature is thus normally protected from burn outs.

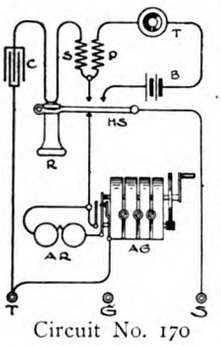


Circuit No. 30

Circuit No. 170—Ring Through Telephone Wiring. This is the same circuit as our standard bridging telephone, excepting that a condenser is included in the receiver circuit so that parties listening on the line will not prevent other parties on the same line from being rung. A properly designed condenser which we use for this purpose gives the best possible results.

Circuit No. 320—Central Checking Telephone Wiring. This is a bridging telephone provided with a direct current generator so wired that the subscribers can only signal central and not ring the other subscribers on the same line.

Circuit No. 380—Divided Circuit Telephone Wiring. This telephone is also the same as our standard bridging telephone, but has the ringer wired to a middle or ground binding post.



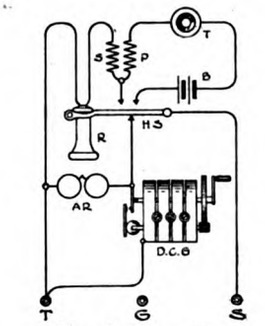
Circuit No. 170

Circuit No. 160—4-Party Selective Telephone Wiring. This telephone uses a biased ringer and is intended for use on systems which are already provided with positive and negative pulsating ringing currents.

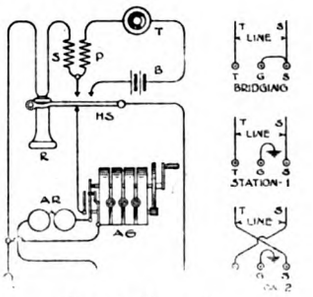
Our Circuit No. 100, not shown here, has a push button so arranged that central can be signalled without ringing the bells of other telephones on the same line. When the button is normal the subscribers can call each other without throwing the drop at central. This instrument is known as our Non-interfering Telephone.

We can wire our magneto telephones for other kinds of service as specified.

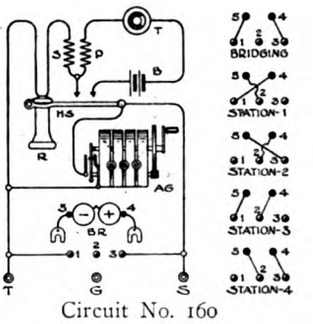
Let us quote you prices.



Circuit No. 320



Circuit No. 380



Circuit No. 160

THE DEAN ELECTRIC COMPANY
ELYRIA · OHIO

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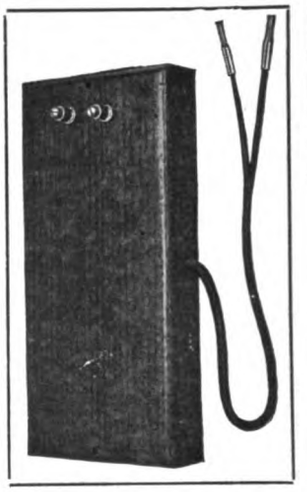
The confidence we place in the reliability of our

"ANDRAE" TELEPHONE CONDENSERS



is so great that we will equip an entire line on trial and back each condenser with our guarantee—that if you can transmit your signals perfectly, from one end of the line to the other, with all your receivers hung up, the two stations farthest apart on the line may ring one another as well, if not better, with all receivers off the hook, as when they were all hung up; and we further guarantee that the talking service will be as good, if not better, than before.

We will go further and say—*you need pay nothing if not satisfied.*

Could anyone possibly do more?

Our condensers are the most simple and most durable on the market.

Style 186 (illustrated herewith) is fitted with a handsome quarter-sawed oak case and is especially adapted for use in connection with telephones *already in operation.*

WRITE TO US TO-DAY FOR CATALOG NUMBER II and become familiar with the stock carried by

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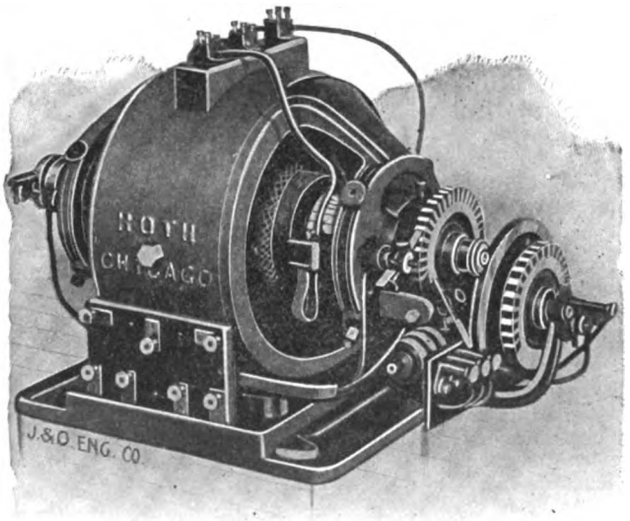

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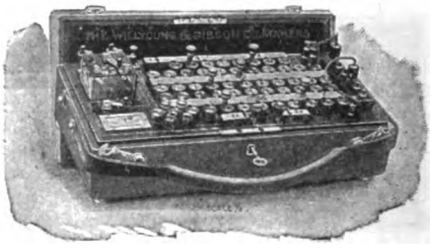

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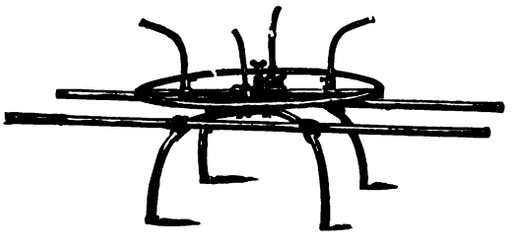

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The V-B Express Drop and Jack

ITS ADVANTAGES

¶ It has a coiled spring restoring device, absolutely positive, simple, always in adjustment.
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¶ One side of the night bell circuit is attached to the frame of the drop (made possible by the heavy insulation of cardboard) thus simplifying the possible chances of trouble.
¶ The slides are so arranged as to make the drop perfectly dustproof, an essential factor with a cut-off jack.
¶ The springs are fastened to the end of the brass mounting plate, which in turn is fastened to the drop shell at both ends, making an absolutely rigid construction throughout.
¶ The night-bell contact is platinum to platinum, made by the weight of the shutter supporter on a short leverage, positive in action.
¶ The mounting device allows the drops to be mounted singly.
¶ The drops are made with accurately built tools and dies, so that all parts are interchangeable.
¶ We shall be glad of the opportunity to send a sample drop. and to write in further detail.

The Vought-Berger Company

Makers of First-Award Telephones and Switchboards

LA CROSSE, WIS.

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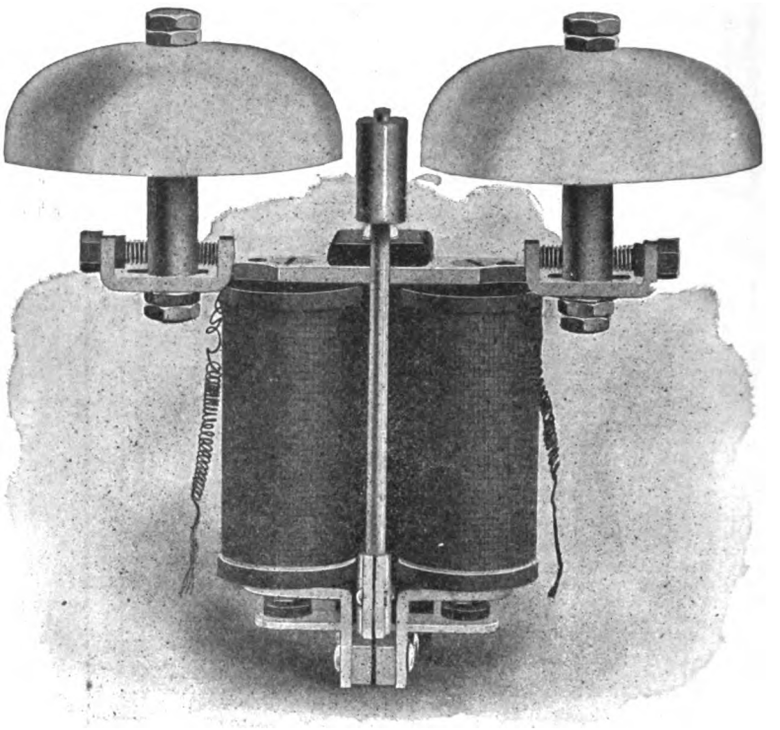
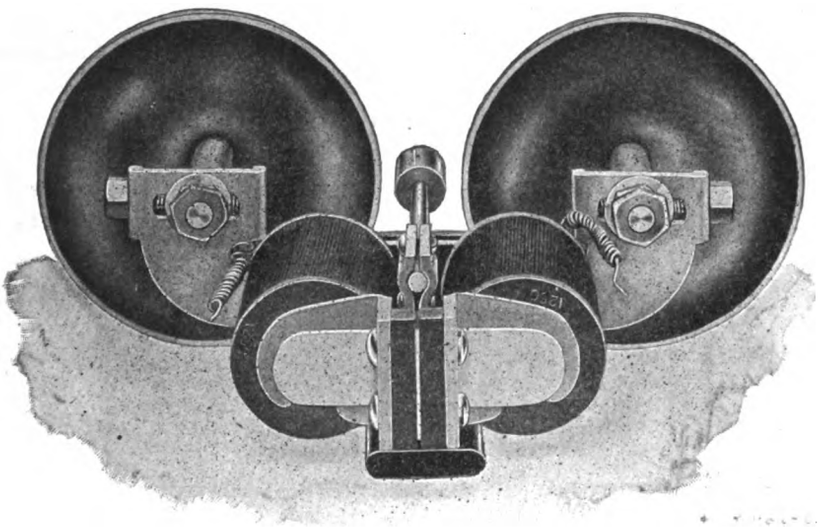
THE NEW KELLOGG

4 PARTY

HARMONIC RINGER

IS THE ORIGINAL RINGER OF THIS CLASS





1—*Interchangeability* with straight line ringers.
2—*Outside appearance* of telephone set with this 4-party ringer is *identical* with straight ringer.
3—Easy interchangeability of different clappers, so as to be able to change over from one party to another any time on the spot.
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5—The permanent magnet is in *metallic contact with the armature.*
6—*No grounds* are needed anywhere.
7—Great economy in operation.
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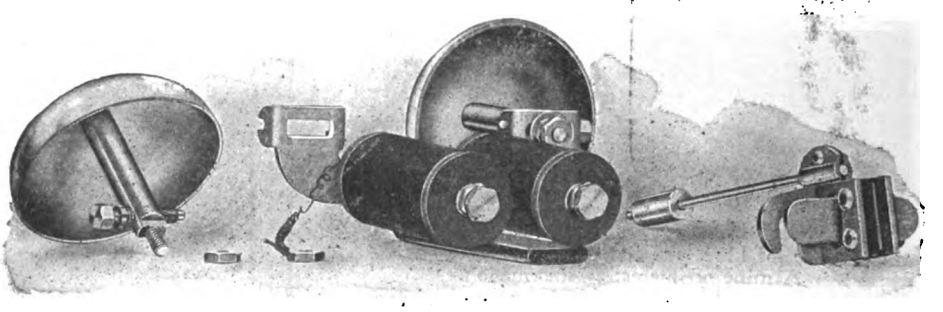

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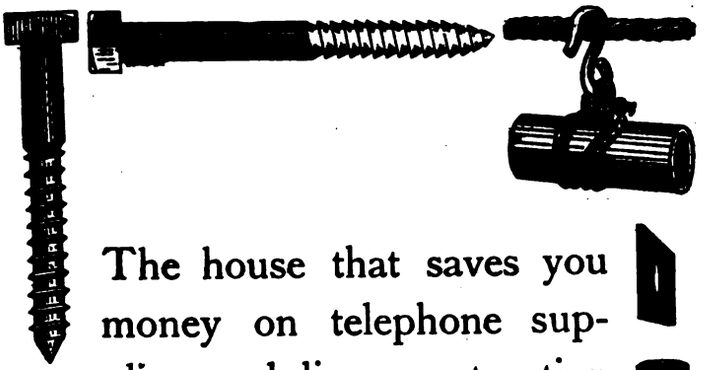

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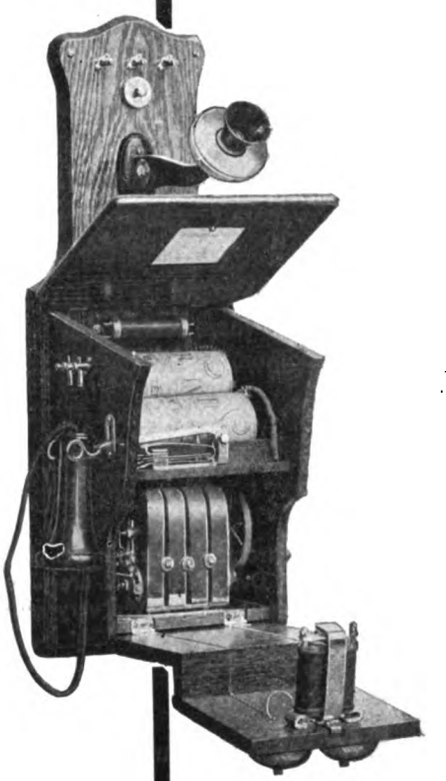

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STRONG GENERATOR
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A GOOD LOOKER

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STROMBERG-CARLSON

The Exchange Manager

Who Wants All the Business He Can Get

will be interested in our new bulletin on Intercommunicating Telephones. It is just such a book as you should have if there is anybody in your town or city needing a system of this kind—and there are. Give us their names, and with your assistance we can land a customer that will mean more rentals and increased dividends for your exchange.

We have the most convincing kind of evidence to offer you that our system is the one for you to put in, or have put in, if it is to be connected with your exchange by trunk lines. Some of them have been in use for 12 years and are still giving good service. Note the letter below and the date.

THE INTERNATIONAL TAILORING CO.,
IMPORTERS OF WOOLENS.

Chicago, Sept. 26, 1905.

Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.:

Dear Sirs:—We are pleased to advise you that your telephone system which has been in use for twelve years, has proved very satisfactory.

Yours truly,
INTERNATIONAL TAILORING CO.

Of course the systems we put out to-day are not to be compared with those we built 12 years ago.

It is remarkable how few telephone companies have ever done anything with this class of apparatus. Why should its development be left to a few of the big Independent companies? Don't think because your exchange is in a small town you have no field to work. There are hundreds of towns in which are located factories, stores, hospitals, etc., that would put in a private system if solicited. Just write and say you are interested and see what we have to offer. We want you to have the bulletin in any event. A postal card as follows will bring it: "Send Bulletin No. 13-B."

TELEPHONE M'F'G. CO.
ROCHESTER, N.Y. CHICAGO, ILL.

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Stromberg-Carlson Cable

It Will Post You How to Buy

We Mail It Free

Drop us a postal and just say "Send Booklet 79-B."

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THE COLUMBUS EVENING DISPATCH, WEDNESDAY, SEPTEMBER 6, 1905.

TELEPHONE SECURITIES IN GOOD DEMAND ON THE LOCAL STOCK EXGHANGE

Installation of the New System Has Greatly Stimulated Interest in the Company.

Caleb L. McKee & Co. say—"Columbus Citizens' Telephone preferred is in good demand at 103½, while nothing was offered below 103½, and it seems quite firm at the latter figure. The installation of the new system has materially stimulated interest in this security and at the same time has had the effect of tightening it up to a considerable extent, as sellers are very scarce. "Columbus Railway common is call

Our automatic System;- always does it,— strengthens the securities and keeps them strong because there's value back of them. It will do the same for yours.

OUR AUTOMATIC SYSTEM ADOPTED IN THE FOLLOWING CITIES:

Chicago, Ill.
Grand Rapids, Mich.
Columbus, O.
Dayton, O.
Lincoln, Neb.
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Sioux City, Ia.
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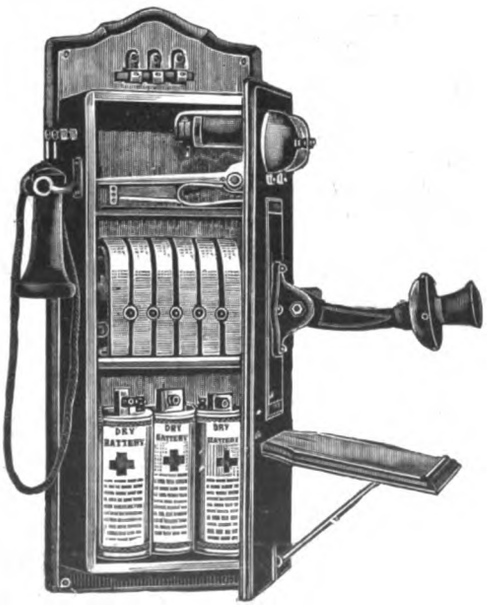
Berlin, Germany.

AUTOMATIC ELECTRIC COMPANY
Van Buren and Morgan Streets, CHICAGO, ILL.

OUR WINNER
STRONG SIX BAR BRIDGING TELEPHONES
Sold on 30 Days' Trial
Send for Our Catalogue
FULL LINE OF
Construction Materials, Tools and Supplies of All Kinds



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Frankel's Electric Testing Clip

Sample dozens...$1.50 per doz.
Lots of 100....11.00 per 100
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Patented Nov. 15, 1904.

GET out of that rut of skinning the wires—IT'S EXPENSIVE.
THIS device will save both valuable time and material—THAT'S PROFIT.
The teeth grip the wire or binding post. The pin pierces the insulation and makes a perfect test connection.

FROM YOUR SUPPLY HOUSE, OR
FRANKEL DISPLAY FIXTURE CO.
718 BROADWAY, NEW YORK

Perfect Transmission

Are you looking for it?
Do you think that you have found it?
We can prove to you that the "Eastern" transmitter is superior to all others.

HOW?

By actual comparative tests.
Others have tried them and use no other.
Why not you?

EASTERN TELEPHONE MFG. CO.
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VOLUME XII *SATURDAY, OCTOBER 21, 1905.* *NUMBER 17*

A Proposed New Method of Handling Toll Checks

ARTICLE III.

By Stuart C. Cross.

At the present day the telephone engineer must plan for the future, and any system which he devises must be such as to accommodate itself to the probable growth for at least ten years. Therefore it must be shown that the telautograph method will be applicable when more than one recording operator is required.

Let the simplest case be assumed, that in which there are two recording operators. It might happen that both recording operators would receive orders for calls to the same toll point at the same instant; in which case they would both connect their senders with the same receiver and try to write at the same time. Interference would result. Some means must therefore be provided to prevent the second recording operator from writing the ticket until the first one has finished. This can be done in one of two ways: Either by equipping each key with a busy signal, which will indicate that the other key is in use; or else by installing a suitable locking device which will prevent the second key cutting in on the circuit when the first one is depressed. The first method is the less expensive, while the second one is the surer. Fig. 9 shows the circuit for wiring 5 recording positions and 10 toll sections. Shown on the right are the receivers at the toll boards, and at the left are the senders at the recording positions. There are 10 rows of 5 keys each, the top row being shown at 1, 2, 3, 4, 5. Beneath each key is a relay r. The normals of the top row of keys are wired to the right hand receiving telautograph. Those of the second row are wired to the next as you progress toward the left. The outer contacts of all the keys in the left hand vertical row are wired to the left hand sender, one terminal of the sender being wired directly to the right hand outer contact of each key, while the left hand outer contact is wired to the left hand outer contact on the relay, the left hand spring of each relay being wired to the opposite terminal of the sender. On the left hand side of each key are two extra contacts, the inner one of which is wired to battery, while the outer one is brought through the two inside contacts of the key to the relay, the opposite terminal of the relay being grounded. The right hand spring of the relay is strapped to battery, while the inner contact is strapped to the relay coil, so that the relay is locked once it is energized. Assuming a case, to show the operation of this circuit, let the left hand recording operator wish to transmit a ticket to the right hand toll board. She would depress the left hand key on the top row. In so doing the inner contacts would be broken before the contact was made between the two extra contacts, so that the circuit through the coil of the relay attached to this key would be opened, preventing the relay being energized. The other keys in this horizontal row, however, not being operated, the relays attached to them would be energized, thus breaking contact with the senders attached to them. Each relay being locked as soon as it is energized, cannot be released by depressing the key associated with it. So that when a key is depressed the writing circuits of the other recording positions are opened at the relays, and no other recording operator can write to that toll board until the key originally depressed has been released.

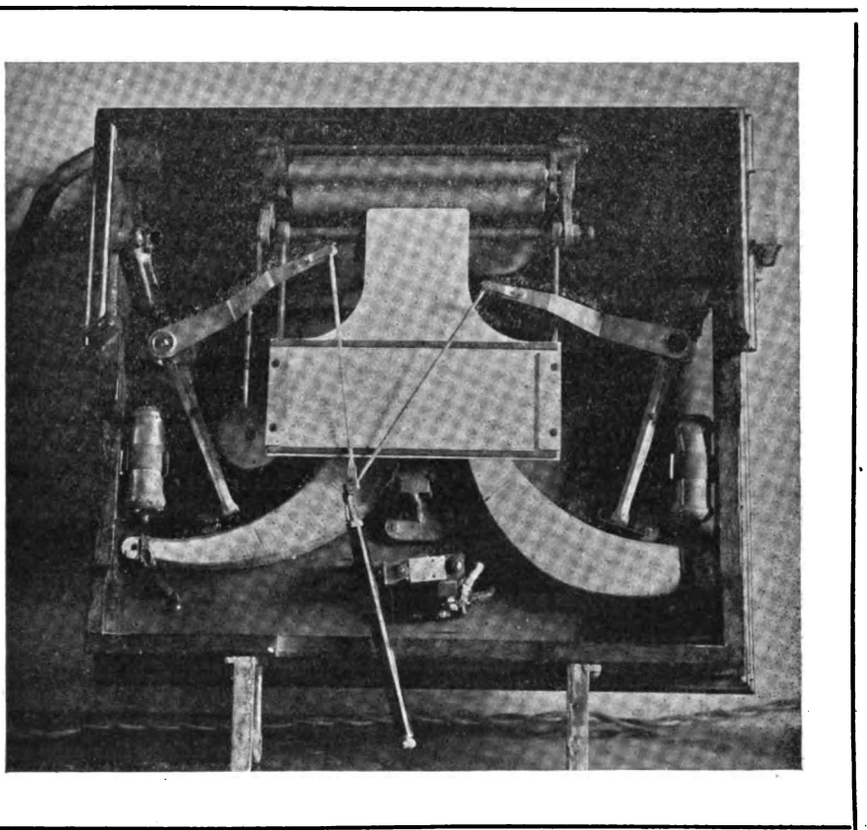

Fig. 8. The Telautograph Transmitting Instrument. Crescent-shaped controlling rheostats are shown at the bottom; also pen suspension.

While this method insures the writing of uninterrupted messages before the toll operators, it does result in a delay in the transmission of a certain number of calls, i. e., those coming in a certain toll point while the writing circuit to this point is busy. It has been estimated that out of a total of 40,000 calls, about 2,000 would be delayed more or less in this manner.

To sum up the various advantages and disadvantages of the telautograph method over the pneumatic tube system of handling

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toll checks, the case will be taken where there are 50 toll positions and 25 recording operators, and the two systems will be compared, as to first cost, expense of operation, and efficiency in operation.

Cost of Installation.—The cost of installing a pneumatic tube system for 50 toll positions and 25 recording operators, including a distributing table, signalling apparatus, blowing engine, and all necessary apparatus, including repairs, is about $15,000.00. With the telautograph system the cost of everything can be estimated except that of the telautograph itself, which at the present time is not for sale. Leaving this out of consideration, then, there would be:

25 × 25 keys at $1.00	$625.00
25 × 25 relays at $2.00	1,250.00
Cable and wiring	2,000.00
Incidental	100.00
Total, exclusive of telautographs	$3,975.00

As a conservative figure, $50.00 may be placed as the cost of a telautograph, either for sending or receiving. Assuming this figure as correct:

50 telautographs at $50.00	$2,500.00
Total	$6,475.00

In regard to the operating expenses, these must be estimated, as no very reliable figures are at hand showing the cost of maintenance of either the pneumatic tube apparatus or the telautograph. It will be safe, however, to figure the depreciation and annual cost of maintenance at 5 per cent. each.

Pneumatic Tube System.—

Original cost	$15,000.00	
Interest, depreciation and maintenance		$2,250.00
Cost of power at $150 per mo		1,800.00
Total annual charge		$4,050.00

Telautograph System.—

Original cost	$6,475.00	
Interest, depreciation and maintenance		$971.25
Operating expenses figured on the basis that 1 ampere is required for each set, and that the office will be operated at its full capacity for 8 hours, the cost of current being .01 per ampere hour, 25 × 1 × .01 × 8 × 30 × 12		720.00
Total annual charge		$1,691.25

which means an annual saving of $2,358.75 over the expense of the pneumatic tube system.

Relative Efficiency in Operating.—It has been shown that the time taken for a toll check to pass from the distributing table through the pneumatic tube to the toll operator is, under the best conditions, six seconds. Some tickets are lost, and many require a much longer time to reach their destination. The percentage of lost tickets, and the average time for these tickets to reach the toll operator is indeterminate; so that the above figures will be taken for comparison. In the time taken to put a call through, therefore, there is a gross saving of six seconds in transmission in favor of the telautograph system. Against this must be charged off the amount of retardation put upon the recording operator as already explained, and the delay in ticket writing due to the crowding of the writing circuit. These two factors can only be estimated, since no actual tests have yet been made. It is safe to say, however, that the entire sum of the delays due to each one of these causes will not amount to three seconds. This leaves a net gain of three seconds per call over the results obtained under the *best* conditions with the pneumatic tube system.

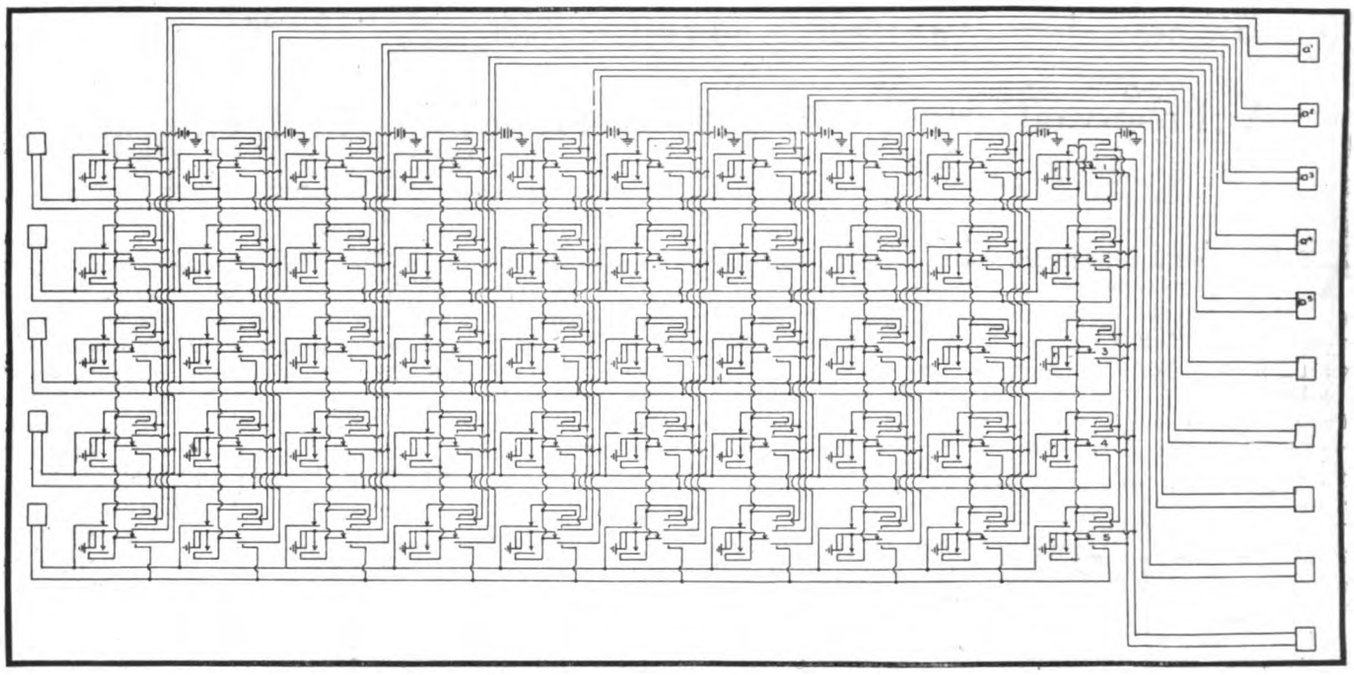

Fig. 9. *Connections for sending and receiving instruments.*

TELEPHONE COMPANIES SUED FOR TAXES.

CORPORATION Counsel Lewis, of Chicago, has followed his demand for an assessment by the board of review of the tunnels belonging to the Illinois Tunnel Company, with a letter giving notice that he intends to bring suits against the Chicago Telephone Company, the People's Gas and Coke Company, the Chicago Edison Company and the Commonwealth Electric Company for $532,800 back taxes alleged to be due the city.

He says that for the last six years the property of these corporations has been undervalued, with the result that the losses each year have been as follows:

Chicago Telephone Company	$33,000
People's Gas Light and Coke Company	21,400
Chicago Edison Company	18,000
Commonwealth Electric Company	16,400
Total	$88,800

According to the corporation counsel's letter, "the honorable board of review" will discover "a most vital discrepancy between such amounts so reported and those returned before your honorable board and the board of assessors." The reference of Mr. Lewis is to the annual reports of the companies to their stockholders, made in January and the spring of 1905.

It was explained by the corporation counsel that its figures gave only the city's share of losses, which would be much higher if applied to all taxes in Cook County.

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Rate Raising and Straight Exchange Developing

By H. L. Davis.

Editor's Note.—*In the following article the various factors involved in the process of building up a strong list of subscribers and raising rates are each separately discussed.*

SOLICITORS.

A SUCCESSFUL canvass requires for its prosecution a corps of men who have had wide experience as telephone solicitors. The solicitor, to be a success, must have courage, tact or diplomacy, and energy. He must be of good appearance and well informed as to the conditions of both Bell and Independent telephone companies throughout the country. If he is so informed, he will be able to use comparisons in his talks with the people, and put forth a convincing argument. Above all, he must be thoroughly honest and reliable. It is as necessary for a telephone solicitor to be able to talk intelligently upon the workings of a telephone as it is for a solicitor or salesman in any other line to be able to talk intelligently upon the particular article that he has to sell. It is impossible for a solicitor to have regular working hours, but he must work from early morning until late at night in order to secure the best possible results. In a case where two men of equal ability were engaged on the same canvass, one secured twice as many subscribers in a day as the other. The reason for this was that the man who secured the greater number of subscribers kept his appointments and worked all hours of the day, while the other confined his work to only seven or eight hours. There is no place in the soliciting business for any one afflicted with the tired feeling. If a solicitor is told by a prospective subscriber to call at a certain time he must make it a point to be there, no matter what the hour set may be.

SOLICITOR'S DAILY REPORT

NAME PLACE RANK DATE

B	R	CLASS	NAME	RENEWALS NO	OR	NR	INC	DEC	AMT-R	NEW NO	AMT-N
			TOTAL TODAY								
			FOR'D								
			TOTAL TO DATE								

Fig. 1. Daily report for contract agent's information.

CONTRACT AGENT.

The whole responsibility of the canvass should be placed upon the contract agent, or superintendent of solicitors, and he should not be interfered with in any way. He must be a man who has had wide experience in telephone soliciting, and as a manager of solicitors. He must be resourceful, reliable, capable of instructing his subordinates, and experienced in telephone advertising. Such a man can pull through almost any kind of a proposition.

ADVERTISING.

Good advertising, when used in connection with a telephone canvass, is a great help to the solicitors, and greatly lowers the cost of the campaign. John Wanamaker, the great Philadelphia merchant, tells a million people daily what is going on in his store, even if it is but the putting up of a new shelf, or the painting of a door. It would be very beneficial if telephone companies should do the same, instead of keeping what they are doing in the way of improvements from the public.

Long experience has shown that the most effective means of reaching the people is through the newspapers. The day of usefulness of circular letters, pamphlets, etc., is past, and to use them is only to throw money away. It is much easier for a solicitor to secure business (when the public is informed as to the telephone situation) than if he has to talk to people who have no knowledge of the subject in which he wishes to interest them. All advertising should be done by the contract agent or subject to his approval. He is more familiar with the situation, and knows better what to tell the people and how to tell it. A company should determine how much it can afford to spend in advertising, and place its advertisements where they will do the most good. A great deal of money can be saved by making advertising contracts for a period of months. A single insertion is of very little value. It is necessary to keep the name of the company continually before the public and keep people interested in what it is doing.

In giving rates to the public, whether by the solicitor or through the papers, it is desirable to make the figures as low as possible. For instance, if the lowest rate for service is $18 per year, it should not be given as such, nor even as one dollar and a half a month, but as five cents a day. In this way the smallness of the cost is made more manifest. To ask the people for their support upon the ground that the company is purely local and is owned entirely by home people does very well sometimes; but the best way to get telephone subscribers is by appealing to the pocketbooks of the public.

RATE RAISING.

People are naturally against an increase in the price of service of any kind, but this seems particularly true in the telephone business. This is because they know so little about the management of an exchange. A company deciding to raise its rates must make a firm stand. Once the fight is started it must never give up, but must insist upon receiving the increased rental. The mistake of publishing circular letters should not be made. It is much better to leave it to the solicitor to tell subscribers the reason which makes the change necessary. He should be able

CONTRACT AGENT'S DAILY REPORT

PLACE_____ DATE_____

NO. SOL.___ COMMENCED SOL'G_____ REC'D_____

CLASS OF SERVICE	THIS DATE CONT R	THIS DATE CONT N	THIS DATE AMOUNTS R	THIS DATE AMOUNTS N	FOR'D TO DATE CONTS R	FOR'D TO DATE CONTS N	FOR'D TO DATE AMOUNTS R	FOR'D TO DATE AMOUNTS N
F.R. BUS-IND								
FR-BUS-2PTY								
FR-BUS-4PTY								
FR-RES-IND								
FR-RES-2PTY								
FR-RES-4PTY								
MS-IND								
MS-2PTY								
MS-4PTY								
MS-10PTY								
NS-IND								
NS-2PTY								
NS-4PTY								
NS-10PTY								
RURAL								
EX.SET-FR								
EX.SET-MS								
EX.SET-NS								
EX.BELLS								
EX.LIST								
EX-RADIUS								
P.B.EX.								
SPECIAL								
TOTAL								
G.TOTAL								
CAN'CL'D								
NET RESULT								

RECEIPT OF CONTRACTS ACKNOWLEDGED AND ACCEPTED

SIGNED

CONTRACT AGT. MANAGER

Fig. 2. Daily report for manager's use.

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to show in a clear and concise way the financial condition of the company, and to outline its plans regarding improvements and possible extensions. He should make a vigorous attempt to convince the subscriber that the increase is not for the purpose of swelling the profits of the company, but to improve its service.

SECRECY ADVANTAGEOUS.

Intended increases in rates should be kept from the public as much as possible, as by taking it into confidence early information is given to the Bell company. This information will undoubtedly be used to precipitate a fight. The contract agent should have entire control of this matter, and all inquiries relative to the change should be referred to his department. A list of the residence subscribers should be arranged and solicitors should call on them first. If it is possible the business places should be left until all the residences have been changed. Then a list of residence subscribers who have the new rate may be presented to the business houses. In this way the business places are compelled to make the change, as they cannot afford to ignore the residence subscribers. Of course many of the subscribers will threaten to give up their instruments if the change is made. Some will even desert to the Bell company, and discouragement may be anticipated by those interested in the change. In many cases the same subscribers will come back again, but for every subscriber lost, an effort should be made to secure a new one. By conducting a rate raising proposition along these lines it will be found at the end of the canvass that the company has as many, if not more, subscribers, than when the canvass was started, and they will all be paying an increased rate.

DIRECTORY.

If a canvass is bringing good results, it is important to publish a directory often, for it is a conclusive proof to the public that the company is growing. The people should be shown that their patrons and friends are subscribing for your telephone, which will make them more likely to patronize your company than if they are in doubt as to who is on the list. The public should be notified of the company's intention to issue a directory long before it is sent to print and their attention called to the advantage of having their names listed therein. If a non-subscriber makes a request for a directory, it is well to send it to him by a solicitor. Any one making such a request shows that he is interested in the use of the telephone, and it should not be difficult for a solicitor to talk him into subscribing. The extra expense of classifying business subscribers will more than pay for itself and should not be left undone. This plan deals very forcibly with business men, and is the means of securing many new subscribers.

RECORD.

In raising rates or soliciting new business a record should be kept of every person called upon. A blank for this purpose is shown in Fig. 1. This form is similar to the one used by our organization and is considered by us to be the best. Each solicitor is furnished with a pad of these, and he makes out one for each prospective subscriber secured during the day. These tickets are turned in to the contract agent, and after the remarks are carefully noted, the tickets are filed away. If the solicitor notes on the ticket that the party called on is to be seen again on a certain date, the ticket is filed for that date, and each morning the contract agent looks through the file and gives the solicitor the "call backs." In this way the necessity of carrying a note book is done away with and the solicitor never loses nor forgets his "prospects."

REPORT FORMS.

Report forms are used for the purpose of keeping the manager informed as to the work being done by the contract department.

CONTRACT AGENT'S MONTHLY REPORT

DATE ____ PLACE ____ CONT. AGT. ____

DAY	RENEWALS NO.	RENEWALS INC.	RENEWALS DEC.	RENEWALS AMT.	NEW NO.	NEW AMT.	TOTAL EACH CLASS	R	N	TOTAL
1							F.R-BU.IND			
2							F.R-BU-2PY.			
3							F.R.BU.4PY			
4							F.R-RES.IND			
5							F.R-RES 2PY			
6							F.R.RES 4PY.			
7							MS- IND			
8							MS. 2PY			
9							MS. 4PY			
10							MS.10 PY			
11							NS-IND			
12							NS-2PY			
13							NS-4PY			
14							NS-10 PY.			
15							RURAL			
16							Ex.SET. FR			
17							Ex-SET-MS.			
18							Ex SET. NS			
19							Ex-BELLS			
20							Ex. LIST			
21							Ex-RAD'S			
22							P.B. E.x.			
23							SPECIAL			
24							TOTAL			
25							FOR'D			
26							G.TOTAL			
27							CANC'LD			
28							NET-TOL			
29							GROSS AMT.			
30							NO. CONT'S			
31							NO. SOLICT'S			
TOTL							TOTAL COST			
FORD							COST PER. C.			
TOTL							DATE COM'CD			

Fig. 3. Monthly report to manager.

A daily report (Fig. 2) is made out by the contract agent each day and given to the manager. At the end of the month a report (Fig. 3) is made out, showing the amount of business secured during the month. By the use of these reports the manager is kept constantly in touch with the growth of the subscription list and is enabled to secure prompt installations of equipment.

Enthusiastic Meeting of the Seventh District of the Indiana Telephone Association

FIFTY-TWO of the sixty Independent companies of the seventh district of the Indiana Independent Telephone Association, comprising the counties of Boone, Hamilton, Hancock, Hendricks, Johnson, Marion, Morgan and Shelby, were represented in Indianapolis on October 11, at the quarterly meeting of the district, held at the office of C. S. Norton, assistant secretary of the New Long Distance Telephone Company. The men present, whose district contains about 35,000 of the nearly 200,000 Independent telephones in the State, were welcomed by H. B. Sale, general manager of the New Long Distance Company. The president of the district, W. W. Mendenhall, of Westfield, presided.

Mr. Sale, in his address of welcome to the delegates, spoke in part as follows:

"In Marion County, alone, there are more than twice as many Independent telephones as there are Bell, and in the surrounding

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counties, which this district represents, there are at least six times as many.

"There is no district wherein the capital of a state lies where such a condition exists as that with which we have to contend, and we should, therefore, all rejoice in the great achievement we have attained. While the Central Union Telephone Company is exerting every effort, by solicitation, persuasion, free telephones, and every other means which their corps of special agents can devise, to obtain telephone subscribers, the Independent companies are exerting every effort to meet the unsolicited demand for its service.

"The greatest trouble which Independent companies have heretofore experienced, has been the absence of organization, and lack of knowledge of the magnitude of their business. Their mental attitude has been that of considering the Bell company a giant corporation, which could swallow them up, or trample them under foot, if it so desired. This is an absolutely absurd standpoint, because it would be utterly impossible for them to accomplish such a feat, even though they had the necessary funds. The proper thing for Independent companies of Indiana to do, is to strengthen the weak members in the organization, and to impress upon the people that the Independent movement is a permanent thing, and will be—as it has been in the past—the greatest commercial and financial institution in the state.

"There is invested in Independent telephone property in this state fifteen million dollars, and all of this is for the legitimate installation of telephones and toll lines. While I have no doubt the Central Union Telephone Company, and its parent, the American Telephone & Telegraph Company, have spent approximately 75 per cent. of that amount of money in the State of Indiana in installing telephones and getting new business, they have, for their expenditure, something less than 30,000 telephones, whereas the Independent companies have more than 170,000 telephones. This is approximately six times as many as the Bell company has. Considering the fact that we have never had connection with Chicago or Cincinnati—the two largest business centers outside the state, with which the people of this state transact business—this is marvelous; and judging from movements with which I am familiar, this condition will not long exist, in that Cincinnati and Chicago will be compelled to have Independent telephone plants to maintain the business from this state which they have been enjoying.

"The New Long Distance Telephone Company, alone, has more circuit miles than the Central Union and American Telephone & Telegraph companies had prior to the inception of the Independent movement, and it owns about one-half of all the toll lines in the State. I have no doubt that within the next year very large extensions will be made by the New Long Distance company, which will give all points within the state ample facilities for their toll business.

"The Independent movement has been the growth and outcome of the necessity for good service and courteous treatment, and it therefore stands to reason that the Independent companies will continue to grow and prosper as they have heretofore, and the Bell will only get such business as it can obtain through the influence of inadequate toll line facilities."

The first topic on the program was "Direct Connection." This was discussed by Mr. Hawkins, of Noblesville, and Mr. Norton, of Indianapolis.

At the beginning of the business session Mr. C. S. Norton, secretary of the State Association, explained the purposes and plan of organization. He said formerly there were five district Independent telephone associations in Indiana, all of which have been absorbed by the State Association and a system of district branch associations, the latter to meet quarterly. The purpose of such an organization is to increase the value of securities, decrease general expenses, unify operating methods, standardize equipment, improve the service, harmonize all interests, assure continued success and to assist all the members to stand solidly together against the Bell company.

The representatives of the companies present signed the constitution and by-laws of the State Association, and a committee was appointed to draft additional by-laws and rules for the district association.

Telephone Investments—and Others*

By Frederick S. Dickson.

AGAIN, transportation companies of all kinds are peculiarly subjected to loss from business depression. When general business is good the railroads make money rapidly, but when business depression rules, it is difficult for a transportation company to reduce expenses. Experience has shown on the other hand that business depression has had but little effect upon the mails, the telegraph or the telephone. People must communicate with each other whether business be good or bad.

The telephone has been criticised freely in the past because of the rapid improvement in equipment, necessitating a change of apparatus before the old had reached anything like its limit of use. During the formative period in telephone development, this criticism was just, but these conditions are not likely to continue, as most of the apparatus now in use has apparently reached its highest development. Old switchboards that required thirty seconds to answer a call had to be abandoned in favor of those that could do the work in five. Improvements that would still further reduce the time would be of little moment. The user will no longer wait half a minute if five seconds be sufficient, but the difference between five seconds and three, for instance, would scarcely be noticed. There seems to be, however, no limit to the change in railroad equipment. Both rails and rolling stock are increasing in weight and this necessitates the replacing of old bridges with stronger ones. The location of the right of way must be changed to avoid grade crossings, to reduce distances and to eliminate sharp curves. Enormous amounts of earth must be moved in cutting down heavy grades. The New York Central Railroad is now spending millions in increasing its terminal facilities in New York City, and it must in the near future spend other millions in elevating its tracks through numerous large cities and towns on its line. A telephone line may be long or short, straight or crooked, but the passage of the voice is not delayed in the least by this, and no money will be required to cut out sharp curves. Year by year it will extend its conduit system where business will justify it, putting its wires underground safe from the elements. This will take much money, but the saving in maintenance charges will pay the interest on the cost.

When railroad lines are built they can not at first earn operating expenses. They are the pioneers of development and they must wait for their profits until the community they enter becomes populated. The people of Cleveland want a crosstown street railroad on Doan Street, and the company is ready to build it, although they know that for a couple of years to come, it can not pay anything on the cost of construction. The company must wait for the future to produce profits and it is willing to wait, as experience proves that settlement follows the line of railroad development. On the other hand a telephone company is in no sense a pioneer. It is not begun until the population demands it. It does not extend faster than its customers increase. It does not buy cable, or wire, or telephones until the contract for their profitable use is executed. Its capital begins earning money before its bills must be paid. It seems scarcely necessary to call these points to the attention of investors. They are self-evident. All thinking men must know them, and yet to-day investors are willing to lend their money to railroad companies on a return of

*Second extract from book recently published by Mr. Dickson.

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about three and one-quarter per cent., and hesitate or refuse to lend to the telephone company for return of five or even six per cent. What is the matter? After all, do thinking men think much?

6. *Communication* may be by 1 Mail, 2 Telegraph, or 3 Telephone.

1. *Mail.* This is the province of the government and therefore no securities based upon it appear in our markets. Whether or not all methods of communication, including the mail, the telegraph and the telephone, should not be under the charge of the government is a question for the future to decide. If government ownership of public utilities is to be extended the effort should begin here with the telegraph and telephone. Let the State first prove its ability to do this work economically and well before undertaking transportation. This would seem to be business wisdom.

2. *Telegraph.* The telegraph has proved its ability to make money on fairly reasonable charges, and competition has made the charges reasonable and the service satisfactory. At the same time the business is not being conducted economically nor wisely. On a highway leading into an ordinary Ohio town there are four lines of poles, expensive to construct, expensive to maintain and offensive to the eye. In the town itself there are two telegraph offices, at least, and if the town be large, many sub-offices. There are also two telephone companies with main offices to pay for and thousands of sub-offices, for every telephone is a sub-office. Every pair of telephone wires leading into the town may be used constantly day and night for conversations, and at the same time could be used, and in many cases is used, to send not less than four telegraph messages, without the least interference. Under government ownership there would be but one line to take care of. Under private ownership there should be but two lines, owned by competing companies, doing both a telegraph and telephone business. This combination is certain to be made because it has solid economic reasons to support it. When it *is* made the telephone companies will have the greater advantage in position because they could install telegraphic apparatus at a cost of $25 a station, while the telegraph companies could not duplicate the telephone plants at an average cost of less than $35,000 an exchange. While waiting this inevitable development the telephone company can continue to lease its wires for private telegraph lines. This is the telephone company's most valuable by-product, and it can be developed to an almost unlimited extent. As soon as the telephone company acquires a safe and substantial position in the financial world the development of the telegraph branch of its business is bound to be marked, and its effect on general business interests of the first importance. The investment of a trifling sum would give the telephone companies control of the greater part of the telegraph business of Ohio, for they could do this business and make money at rates which would be impossible for the company doing a telegraph business alone. This, though, is a matter for the future, but the near future, and so it has a present influence on the value of telephone securities.

STOCKS AND BONDS.

In discussing this question we will try to be understood by the least informed, even at the risk of being tedious to the best informed, and for the benefit of the least informed, let us state in the beginning that investments are in the main of two sorts: 1 *Stocks* and 2 *Bonds*.

1. *Stocks.* Corporations are an outgrowth of partnerships and shares of stock in a corporation simply represent the interest of the holders in the business. Stockholders are really partners who are not liable for the debts of the partnership, and can sell their interest, or buy more, or borrow money on their shares, with very little trouble and without getting the consent of any of the other partners.

Stocks are of two kinds: *Common* and *Preferred. Common Stocks* have a par or original value of whatever sum the corporation may choose to name. Generally this is $100 per share, though sometimes it is for a less amount, as in the case of the Cuyahoga Telephone Company, where it is $50 per share. The original holders are presumed to have paid this par value, whatever it may be, into the treasury of the company on its foundation. Sometimes this is so, but more often it is not so. The makers of corporation laws are trying all the time to compel such a payment, and the makers of corporations are trying just as hard to devise means to lessen this payment or to avoid it altogether.

Sometimes it is very difficult even for the officers and expert bookkeepers to say how much has actually been paid in on a certain stock, and when you do get the best available information on this point, there is another very important question to be asked and answered: Has the money paid in been wisely spent? This question is even harder to answer than it is to tell how much there was to spend. So there is another value of stocks, and that is the selling value. The selling value represents the estimate of the general public as to the real value, and it may be far above par or far below, but it depends upon what the public believes is there, what its earning power is now and what it is likely to be in the future.

Preferred Stock has certain advantages and sometimes certain disadvantages when compared with common stock. It is called *Preferred* because it is entitled to receive earnings to a certain extent before the common stock can get any share in the earnings. Sometimes this preference extends also to the distribution of assets in the event of the dissolution of the corporation. After the bondholders are paid and the debts are paid, the preferred stockholders get par value for their stock before the common stockholders get anything. Then, *Preferred Stock* may also be *Cumulative;* that is, entitled to receive a certain dividend each year, and if the company does not pay it in any year, the dividends accumulate and must be paid some time in the future when they are earned. Sometimes also a preferred stockholder is not given the power to vote for directors, but this power is lodged solely in the hands of the common stockholders. The dividend on preferred stock is generally limited to a certain rate, and can never be more, however profitable the business may be, while there is no limit to the dividends which may be paid to the holders of the common stock, excepting only the power of the business to earn money.

Now the preferred stock of the Cuyahoga Telephone Company is cumulative. It must pay 6 per cent. dividends every year, and if it fails to pay in any year the amount must be made up in the future if it earns the money. It is preferred as to assets as well as to dividends, and the holders have the same right to vote that the common stockholders have.

2. *Bonds.* A bond is simply the evidence of money loaned to a corporation secured by a mortgage to a trustee, who, in case of necessity, will act for the protection of all the bondholders. Bonds may be made due and payable at any time in the future, and so, too, the rate of interest is fixed by the corporation at as low a rate as it is presumed the public will ask them. If the public think the rate of interest too low they refuse to pay par value, but offer something less. In calculating the value of a bond, therefore, you must know not only the rate of interest, but also the date when it is due, as well as the security behind it.

(*To be continued.*)

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QUERIES

DESK SET CONNECTIONS.—(612.)

Will you please show a diagram of the wiring of both series and bridging magneto desk sets and oblige M. C. K.

Fig. 612 *a* showes a simplified series desk set circuit, also the actual wiring of a complete series desk set. Fig. 612 *b* shows

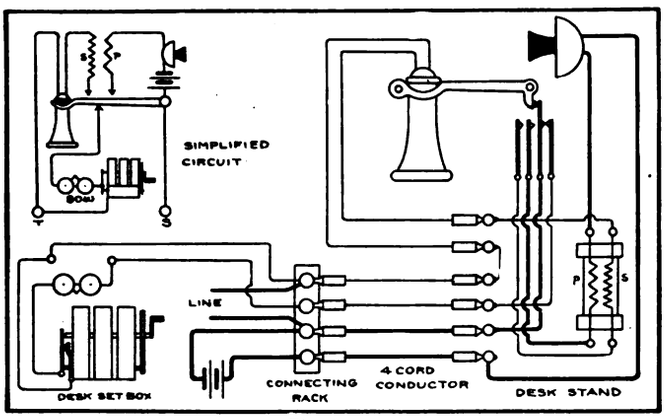

Fig. 612 a.

similar circuits for bridging desk sets. The only difference is in the desk set box, a shunt contact being provided in the bridging circuit to short circuit the ringer winding when making a call by means of the hand generator. This shunt contact is indicated by the dotted line in Fig. 612 *b*.

GROUNDED AND BRIDGING LINES.—(613.)

Is it practical to make a grounded extension to a metallic line. N. C. T.

NO, it is not. The grounded extension will in all probability make the metallic line noisy. The only way such a connection should be made is through a repeating coil designed for both ringing and talking. The better plan would be to make the extension metallic.

DIFFICULTY TO RING.—(614.)

On one of our party lines we have great difficulty to ring any of the parties at times, yet the talking qualities are good. What is the trouble? T. E. A.

Examine the line carefully for possible shunts. These may be caused by broken insulators, limbs of trees crossing the wires

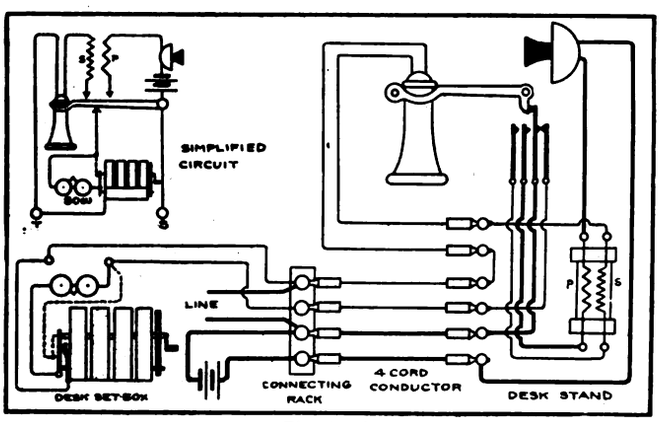

Fig. 612 b.

or a defective ringer in any one of the instruments. In the latter instance part of the winding of the bell coils may be short-circuited, or else loose connections of the coils may intermittently be grounded on the frame. Where the wires enter the buildings the insulation may be worn off. The woodwork to which the wires are attached, if damp, will also offer a path of high resistance, which, while not appreciably affecting the talking current, yet offers a sufficiently low resistance path which forms a shunt for the ringing current, and consequently the bells will not receive the necessary quantity of current to operate them. The trouble may be very difficult to locate, but by examining every possible point for the difficulty you should be able to find it and clear it.

PACIFIC COAST BELL CIRCUITS.—(615.)

Please give details and descriptions of keyboards in use by the Pacific States and Sunset Companies. L. A.

THERE are at present four different A board circuits in use by the companies mentioned, but they are now being changed to regular Western Electric specifications with the exception of a local battery circuit which is the regular cord circuit with clearing out drops. If you will state more definitely just what circuits you desire we will publish them in an early issue.

POWER CIRCUIT PROTECTION.—(616.)

How are the power circuits for operating switchboard power apparatus protected against lightning discharges? G. L. M.

We presume you refer to the commercial power circuit entering the building. If aerial, the device shown in Fig. 616, styled a "power protection panel," is frequently employed. In detail, it

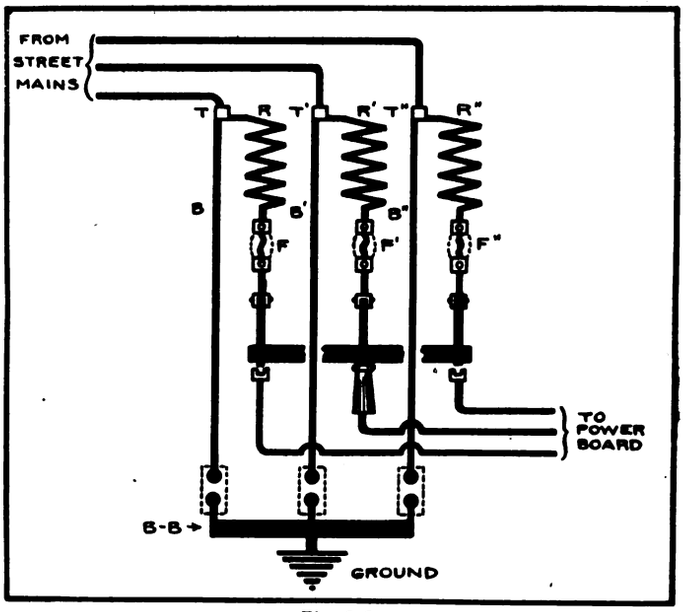

Fig. 616.

consists of a heavy slate panel, held out some little distance from the wall by an iron framework, with main line fuses and switch mounted upon the face. The type illustrated is designed for a three phase alternating circuit of three wires. In the back are *T*, *T'* and *T"*, terminals for the outside connection. From them run heavy copper bus-bars, *B*, *B'* and *B"* to metallic balls, set in plaster of paris on the face of the panel, and separated by a very slight air gap from similarly located balls, strapped by bus-bar (*B-B*), which is thoroughly grounded.

From the terminals *T*, *T'* and *T"* the circuit is taken through retardation coils *R*, *R'* and *R"*, through the main line fuses *F*, *F'* and *F"*, and the three-pole jack knife switch, from which it is taken to the power board.

The device takes advantage of the retarding effect offered a lightning, or static discharge, by closely wound convolutions in the circuit affected, and the discharge is offered an easy path to ground by the metallic balls, which it takes in preference to going through the coils.

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THE EDITOR'S PAGE

THE TELEPHONE IN THE RETAIL TRADE.

THE telephone in the retail trade cannot be called an innovation. It cannot be said that those engaged in that class of business are not aware of its great advantage. It is not to be believed that any arguments would be advanced by those objecting to its installation, except on the grounds of a fancied economy, or a determination to cling to the old, archaic methods of conducting business without it. This last belief, the belief that the old and tried things are the best, while the new are to be regarded with suspicion and contempt, is the attitude of conservatism carried to an extreme. It is a relic of days which set aside progress for apathy, and spent as much time in observing ancient customs, as would, if devoted to the new, up-to-date, hustling American methods, have been a sure basis for substantial success. It is not only that the installation of a telephone means greater convenience in transacting the affairs of a growing business, but it shows the entrance of a new spirit, which, in combination with other influences, is widely acknowledged to be the driving power of the age.

The retail business is different from that of others. It has demands made upon it, which call for a certain personal make-up, a readiness to oblige in things that seem trifling. The retail dealer, unless unusually well stocked with patience, would rapidly succumb to inevitable attacks made upon him during busy hours. To lighten his labors it seems as though no better means could be found than that supplied by the telephone. In fact, the truth of this observation is found in a variety of impressive instances.

Every large city has within its confines sufficient of that class of retail stores, in which the telephone orders alone keep a number of the staff busy, to be able to supply any quantity of data on the subject. The question arising with respect to this fact is the extent to which their business is increased by telephone. Or to take another view of the case, the extent to which the retail business of any store would suffer were the telephone removed.

To answer either of these questions with respect to almost any other line of commercial life would be to obtain but one response. In certain kinds of commercial and industrial occupation the telephone is as indispensable as are paper and pen. The tremendous volume of financial business transacted in Wall Street is all sent over the telephone. The activity in the various other districts in New York City likewise gives examples of the necessity for the telephone in the swift transaction of business. The woolen, the white goods and the strictly commission lines are everyday examples of the breadth and scope to which telephoning is done, and the telephone is used as a *direct instrument* of business.

To question for a moment its influence in the strictly retail field, in a sense, borders upon the ridiculous. The data which could be compiled would show that the orders telephoned in to our large department stores, and to other smaller institutions of a similar character, would mount up to thousands of dollars per annum.

But another suggestion must be considered in connection with this question of the telephone in the retail trade. It is the question as to whether the telephoning now done would not be multiplied a thousand fold if a telephone instrument were installed in every home, the same as water or gas. If the telephone in New York were as widely used by the public, not meaning the retailer or wholesaler, but just the public, is it not to be believed that the position it would assume in the household would be second to none that can be imagined? It is an actual loss to the retail store that such is not the case. Barring the natural desire of the greatest of our shoppers, the women, to see what they are buying, a great mass of orders for the ordinary home necessities would come over the telephone each day. The idea of sending postal cards means delay. During rainy or otherwise stormy periods, the retail trade suffers much, and stores and public alike would benefit by the general use of more telephones.

A FEATURE OF THE PANAMA CANAL PROPOSITION.

AGITATION concerning the future completion of the Panama Canal has been of value, in that it stimulated the trustees of that enterprise to renewed efforts, and effectively hastened the preliminaries of that gigantic task. It led to the introduction of those innovations which are the means of gathering together the various elements composing its working forces. It became the means whereby the unification of all interests associated with the constructive or executive powers became assured, and thus served to give greater solidity to the effort which aimed at success. But it is readily perceived, that this consolidation of interests, this co-ordination of forces, could not yield its expected results, unless there was at hand a means of carrying out in practice as well as theory, this determination. Sending messengers over a low lying district, exposed to torrid heat and miasmic emanations would lead to certain delays in the dispatch of orders. An army of workers cannot well be controlled by this means. Neither is it possible to leave to chance the development of this proposition in any of its distant corners.

For these reasons, the introduction of the telephone and the beneficient influence of its widespread application, is now a prominent factor in the ultimate accomplishment anticipated. The more completely a great undertaking of this character can be guided by a master mind to its final stages of success, the more apparent does it become that the dominating influence, though essentially personal, is still dependent upon a ready channel for its suggestions. The telephone is now supplying that channel; and the groove to be in the earth's surface, which will connect the Atlantic and Pacific, will thus represent the outcome of the employment of capital and labor, best directed to its most rapid and efficient culmination.

It would not be wise to claim more than telephonic performance permits, but it is well within the limits of common sense to regard as essential, in all such problems, that cohesiveness which can only be secured by the telephone, and through which great enterprises conducted on a large scale over a large area are systematically pushed.

It is not to be believed that the opportunities offered by the exercise of engineering knowledge would be disregarded in any instance, where large sums are being spent, and large interests await the culmination of the project. The time for such neglect has passed, and engineering as now understood, embraces all of the means which lead individually or collectively to a victorious consummation of the object in view. The telephone, for this reason, is distinctly an important part of the working organism. Its importance is such at present that through it the future Panama Canal will be hastened to a completion which might otherwise have been long delayed.

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THE TELEPHONE IN THE COURTS

CONDUCTED BY A. H. McMILLAN.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

INJURIES FROM GUY WIRES ON NEUTRAL LAND.

Along B street our guy wires are erected on land belonging to the lot owners and not to the city. A city ordinance prohibits the street from being used by vehicles. In spite of this a fireman driving to a fire crossed the land on which our wires are erected to get to the fire as soon as possible, and running into the wires was severely injured. His lawyer now claims that the wires were negligently erected and that we should pay him damages. Will you give us your opinion of the case? R. J. M.

IF your wires were negligently erected I think you are liable and that the facts that your wires were on neutral ground and that the street was not to be used for vehicles is immaterial. See Wilson v. Great Southern Telep. & Teleg. Co., 41 La. Ann. 1041, 6 S. 781, a similar case.

CUTTING SHRUBS AND UNDERGROWTH.

Our right-of-way contracts give us the right to cut "shrubs and undergrowth" that obstruct the building of our lines. It was necessary for us to cut away a number of small young trees or saplings. The farmer across whose land we were building asks us to pay him their value. This is not very much, but for the principle of the thing we refused. Are we not right? J. P. F.

YOUNG trees cannot be classed as shrubs. Neither do I think they can rightfully be called "undergrowth," for this applies only to plants which grow under or beneath larger plants. You should broaden your right-of-way contracts in the future. Clay v. Postal Telegraph-Cable Co., 70 Miss., 406, 11 S 658.

TAXPAYER CANNOT BRING SUIT TO FORFEIT FRANCHISE.

THE Supreme Court of Nebraska in deciding in favor of the Interstate Telephone Company against George W. Clark, who sought by injunction to prevent the company from securing a franchise from South Omaha to install a telephone system, has this to say in the syllabus:

"A taxpayer of a city cannot maintain a suit to prevent the city from granting a franchise to a telephone company, unless the franchise constitutes such wrongful squandering or surrendering of the money or property of the city that taxation will be increased thereby.

"The remedy to set aside a franchise irregularly or fraudulently granted, where the party to whom it has been granted is in the exercise of the privileges it confers is by quo warranto at the suit of the state, and not by an equitable action at the suit of private parties." The lower court is upheld.

Interstate Telep. Co. v. Clark, 101 N. W. 977.

TAXATION OF IOWA RURAL TELEPHONE COMPANIES.

THE representatives of 140 rural telephone companies in Linn County, Ia., have determined to fight the executive council of Iowa to a finish through the courts. For the past three years the state executive council has been assessing the rural telephone lines, together with the toll lines and telegraph lines. The board of supervisors has been canceling these assessments, holding that the lines are as much a part of the realty as a house, or a barn; that their value is returned by the county assessor, and that the assessment by the state executive council is therefore a double assessment.

The executive council has commenced suit in the district court to compel the taxation of the rural lines according to its assessment, including the taxes for the last three years. The action of the telephone men is backed up by the board of supervisors. Companies in Jones and Cedar counties will also assist.

THE CUTTING OF POLES RESTRAINED.

A FOUR DAY'S injunction has been granted by Judge Johnson of Media, Pa., at the instance of the Keystone Company, against Wood, Harmon & Company, promoters of the tract known as East Lansdowne, to restrain the real estate men from cutting down the poles or otherwise interfering with the service of the telephone line running through the town. It is alleged the right-of-way was given to the telephone company by the East Lansdowne Improvement Company, to which it was turned over for certain improvements by Wood, Harmon & Company. The latter claim the improvement company exceeded its authority in giving the right, and threaten to cut down the poles.

CONNECTIONS FOR MUNICIPAL TELEPHONE COMPANIES.

JUDGMENT of the Railway Commission in the dispute between the Bell Telephone Company, the Canadian Pacific Railway Company and the municipalities of Port Arthur and Fort William regarding the question of giving connection to the municipal telephone companies of those two towns with the Canadian Pacific Railway station, has been rendered by Judge Killam. Judge Killam holds that the Bell Company is only entitled to compensation for the loss it will sustain for the towns of Port Arthur and Fort William respectively. The position of the railway company was different. If the installation of the municipal telephone results in loss to the railway company, then it should receive compensation. The contract was a valuable one to the company. The railway company placed the value over eighteen thousand per annum, which was outside the services given to the Bell Company by the railway.

The evidence, Mr. Killam says, does not furnish a satisfactory basis for definitely fixing the sums to be allowed for compensation. He makes some suggestions, one of which is to fix the loss to the Bell Company at $5 an instrument in both towns. If the company did not allow a representative of the town to examine the records with this view, then it could be done by an independent party. An annual payment could be made to the railway company by either town for the facilities for installing the instruments. If the company refused the sum fixed by an independent party the amount could be left for arbitration. Security should be given to the railway company for a possible loss of $85,000.

SHAM PURCHASE TO CONTROL OKLAHOMA BUSINESS.

THE municipality of Oklahoma City has filed a petition in the district court asking for an order to prevent the Pioneer Telephone Company from raising its rates on business and residence telephones. The order was granted by Judge Burwel. Recently the Pioneer Telephone Company purchased the Missouri and Kansas Telephone Company's interests, and it is now alleged that an attempt will be made to increase the price of telephones. In the petition it is alleged that the purchase of the Missouri and Kansas interests was a sham to control the telephone business in Oklahoma.

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IN THE OPERATING FIELD

FOURTH OHIO DISTRICT HOLDS WELL ATTENDED MEETING.

AN enthusiastic meeting of representatives of the fourth district of the Ohio Independent Telephone Association was recently held at Portsmouth. Thirty-five of the leading men of Clinton, Highland, Vinton, Fayette, Pickaway, Adams, Pike, Ross and Scioto counties were present.

The vice-president of the district, Mr. G. P. Thorpe, of Wilmington, was detained at home by sickness and his place was taken by Mr. H. P. Folsom of Circleville. The business was conducted in an informal manner and reports of various counties were read. The growth in this district has been very satisfactory. Last March, the fourth district reported to the State association as follows: Number of Independent subscribers in nine counties, above 11,335; number of Bell Company subscribers in same counties, 4,093. Report of October 12: Number of Independent subscribers in nine counties, 12,263; number of Bell Company subscribers in same counties, 4,389.

Among the telephone men from outside of the fourth district who were present at the meeting were: F. L. Beam, of Mt. Vernon, president of Ohio Independent Telephone Association; Ralph Reamer, of Columbus; M. B. Overly, Cleveland, general manager of U. S. Telephone Co.; Lou H. Hutchins, manager Huntington, W. Va.; Wm. R. Lee, Milford, O.; W. G. Thompson, Hamilton, O.; C. Y. McVey, Cleveland; D. E. Sapp, Mt. Vernon; J. W. Brooks, Cleveland, and E. L. Coen, Vermillion, O.

Among others present were the following: E. Humphreys, Waverly; D. T. Blackburn, Rarden; W. G. Wroten, Mowrystown; H. P. Folsom, Circleville; J. F. Schley, G. Joseph, E. W. Lutz, of Circleville; C. D. Duncan, Chillicothe; H. S. Grimes, A. H. Bannon, Dr. W. D. Tremper, E. E. Knox, Portsmouth; L. A. Eaton and H. B. Mauck, Proctorsville.

A PROSPEROUS WISCONSIN INDEPENDENT PLANT.

ONE of the most prosperous of the smaller Independent telephone systems in Wisconsin operates in the town of Juda. This company has a capital of $5,000. It not only covers the city, but also reaches out to the towns of Jefferson, Spring Grove and Sylvester, and has a large number of farmers and rural lines connected with its system. John Kryder, of Juda, is president.

BELL LICENSEE COMPANY JOINS INDEPENDENT RANKS.

THE Converse Telephone Company, of Converse, Indiana, which for five years has been a sub-licensee of the Central Union Telephone Company, has severed its connection with that company and now connects only with the Independent systems. O. L. Barger, manager of the Converse company, had been using Bell receivers and transmitters, but on account of the poor toll line service and the limited number of connections, he decided to break off arrangements with the Bell interests and enter into a contract with the new Long Distance Telephone Company of Indianapolis, Ind., and the Delaware & Madison Counties Telephone Company, of Muncie, Ind., for toll line service. The subscribers already notice an improvement in the service and are able to connect with five times the number of telephone users that they could formerly.

As the Converse Telephone Company operates on the border of the United Telephone Company's territory, which, in the spring, was sold to the Bell interests, this move is regarded as very significant, especially since the Central Union Telephone Company has been unable to either purchase or to sub-license any of the smaller companies in this part of the state. It is rumored that several other sub-licensee companies in the United Telephone Company's territory have already entered into contract relations with the Independents, and will return their transmitters and receivers, as soon as their contract expires.

DEATH OF WILLIAM DAVIS BARNARD.

WILLIAM DAVIS BARNARD, of Philadelphia, Pa., died on October 16, of Bright's disease, after a short illness which followed a nervous breakdown.

Mr. Barnard was one of the pioneers of the Independent telephone movement, and was one of the best known men in the field. Besides holding the position of President in the Eastern Telephone Manufacturing Company, he was Vice-President of the United Telephone & Telegraph Company, Cumberland Valley Telephone Company and the Eastern Electrical Construction Company, and a director in the Huntingdon & Clearfield Telephone Company, of Huntingdon, and the Union Telephone Company, of Erie, Pa. He was a member of the Executive Committee of the Pennsylvania Association, and of the Executive Council of the National Interstate Association.

As vice-president of the Eastern Electrical Construction Company, he took a prominent part in the construction of a large number of exchanges, and here conceived the idea of the immense combination of interests which resulted in the formation of the United Telephone and Telegraph Company. This company, of which he was the dominant spirit, covers practically the entire Eastern part of Pennsylvania, and reaches as far West as Altoona, and extends lines across the borders of Maryland and New York. In the territory through which it operates it has upward of 200 exchanges and gives a most satisfactory service. This exceptional development in the heart of the Bell territory is a characteristic example of the enterprises which owe their success to the efforts of Mr. Barnard. His interest in the progress of the Independent telephone movement and the practical efforts which he expended in its development make his loss a matter of concern to all telephone men.

SUBWAY CONSTRUCTION OF THE SYRACUSE TELEPHONE COMPANY BEING RUSHED.

THE Engineering Department of the Independent Telephone Company of Syracuse is making arrangements for a record in subway construction work. As the subway is to pass underneath the double tracks of the New York Central Railroad, it is important that the street be torn up for the shortest time possible. Chief Engineer J. B. Pierce of the Telephone Company has planned to put an experienced and well organized gang of men on the work to complete the work in the shortest possible time. The company is planning to put about twenty miles of subways in Syracuse and of this amount about five miles have already been completed. The work will be finished this fall. The subway construction is of the most modern type, the conduits being entirely surrounded with concrete and the manholes are constructed of the same material.

INDEPENDENT LONG DISTANCE LINES PROPOSED IN SOUTH DAKOTA.

REPRESENTATIVES of half a dozen Independent telephone companies in South Dakota, operating lines in the vicinity of Sioux Falls, Yankton and Geddes, are conferring with officers of the New State Telephone Company and

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THE SHIELD PAY STATION.

ADOPTED BY THE NATIONAL INTERSTATE CONVENTION the SHIELD as the STANDARD Pay Station Sign.

One Operation—Let Go the Coin—No Levers To Pull

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STERLING ELECTRIC CO., LAFAYETTE, IND.
EASTERN ELECTRIC CON. CO., PHILADELPHIA, PA.

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PAY STATION CO.
HARTFORD, CONN.

FOR SALE

Advertisements under this head, $1.00 for 25 words or less for each insertion. Prepaid.

FOR SALE, CHEAP—600 pairs Kaisling self-soldering protectors. Also one 300 pair and one 500 pair American main distributing frame, used less than two months. Will sell separately or together. Address Virden Telephone Exchange, Virden, Ill., or Girard Telephone Exchange, Girard, Ill. 420

SUPPLIES WANTED

WANTED—A Sterling 100 drop section switchboard. Give full particulars in detail. Address, Box 490, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 490

WANTED—I want you to know that I can locate and clear your cable trouble by contract or by the day at a reasonable price. Address, E. C. Chapman, 79 The Hamlin, Toledo, Ohio. 489

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Advertisements under this head 25 cents for 25 words or less for each insertion. Set in bold face type $1.00 per insertion for 25 words or less.

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WANTED—An experienced man in testing telephone transmitters. Must be a most careful workman, sober, and able to supply satisfactory references. A middle aged, married man, now employed preferred. Address, Box 479, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 479

HAPGOODS has over 3,000 different positions listed! Are *you* looking for a better place? Perhaps we can help *you* to secure it. Good openings are constantly occurring. Our business is to find and fill them. Others have secured what they want through us. Delay might lose *you* the position you seek. Send for our free booklet—"Brain Brokers." New York Office, Suite 511, 309 Broadway. Offices in twelve other cities. 464.

POSITION WANTED—In small exchange, as manager, wire chief, or general all-around construction or repair work. Experience all branches telephone work; eight years. Best references. Address Box 450, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 450

"The battery is giving fine service; we would not take double what we paid for it if we could not get another set to take its place."—This enthusiastic exchange manager has a

SILVEY TYPE "R" STORAGE BATTERY

UP TO DATE TELEPHONE MEN HAVE CATALOGUE 126 ON THEIR DESK.

THE DAYTON MFG. CO.
DAYTON OHIO

WANTED—Continued

WANTED—Position as wire chief or switchboard man in medium sized exchange. Central States preferred. First-class references as to ability and character. Address, Box 483, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 483

WANTED—Position as night or day Central by young man who has had experience on good local and exchange line. Day preferred. Quick to learn; steady. Address, Box 186, Waverly, Coffey Co., Kansas. 484

WANTED—Position as Superintendent. Technical education, seven years' experience in all branches of telephone work. At present in charge of exchange 2,000 lines. Married. West preferred. Address, Box 485, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 485

WANTED—Position as manager by married man. Five years' experience. Good, all-around telephone man. Strictly sober. Address, Box 486, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 486

WANTED—Position as wire chief or switchboard man, central energy exchange, by man 23 years old; temperate, industrious; five years' experience. Southern or Western location preferred. Address, Box 487, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 487

WANTED—Inspectors and installers with city experience; common battery system. Applications must state experience and references for past two years. Address, Box 488, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 488

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the Sioux City Telephone Company in regard to telephone connections.

The New State Telephone Company is now constructing a line to Canton, S. D., and will connect many other cities with its lines in South Dakota. The proposal to connect the lines in the vicinity of Geddes and Yankton with the Sioux City lines will, if accepted, give the New State Telephone Company a long line of toll telephones in South Dakota, covering practically the whole State.

DEATH OF JOHN I. SABIN.

JOHN I. SABIN, president of the Pacific States Telephone Company, died in San Francisco on October 10, after a week's illness. Mr. Sabin's name had become familiar to all telephone men through his work on the well-known Sabin-Hampton express system. He was born in New York in 1847, and in 1861 entered the service of the Western Union Telegraph Company. After a varied experience in this field he entered that of telephony, and formed the Pacific States Telephone Company, of which he became president. In 1901 he went to Chicago as president of the Central Union Telephone Company and the Chicago Telephone Company. His work here, however, was not as successful as he had expected it to be, and about two years later he returned to his home in California. He recently, in partnership with other gentlemen, secured a concession for telephone service in the Philippines.

FREDERICK S. DICKSON'S BOOK FOR SALE BY THE AUTHOR.

FREDERICK S. DICKSON'S book entitled Telephone Investments and Others, extracts from which are now appearing in THE AMERICAN TELEPHONE JOURNAL, is for sale by the author and can be secured by addressing him at the Electric Building, Cleveland, Ohio. This work which undoubtedly ranks first as an exponent of Independent telephone securities has an additional value from the artistic standpoint. The illustrations, of which there are many, are beautifully executed and the type is of such a size and style as to enable it to be easily read. The price, 25 cents, or by mail 30 cents, places it within the reach of all and therefore it should be in the possession of everyone in the least interested in the Independent field.

CLEARING HOUSE ESTABLISHED BY INDEPENDENT COMPANIES IN TEXAS.

THERE has been established at Dallas, under a recent charter, an association for the establishment and maintenance of a clearing house, conducting independent telephone business. It is known as the Texas Independent Telephone Clearing House Association. No capital stock is to be issued. The incorporators are A. J. Brown, Cecil L. Simpson, Dallas; E. W. Dunaway, Paris; G. R. Butler, Gainesville; C. A. Shock, Sherman; J. B. Earle, J. E. Boynton, Waco.

GROSS EARNINGS TAX IN MINNESOTA.

IN a decision filed in the district court at St. Paul, Minn., Judge Hallam holds that the Northwestern Telephone Exchange Company must pay the taxes levied on the lot on Cedar street, next to the building occupied by the company. The tax, with the penalties and interest, amounts to $301.46. The court overrules the company's objections, and orders judgment entered for the amount.

The company fought the tax on the ground that it pays the State a gross earnings tax, and that the lot in question is necessary in the operation of the company's business. The lot is used for storing poles and other stock needed by the company, and it was claimed that it was necessary for the company to control the lot in order to provide ample light for its building. In his memorandum Judge Hallam states that the evidence does not show that this lot is necessary to the use of the company's building.

LONG DISTANCE TELEPHONY IN LONDON.

A RECENT report is to the effect that telephone communication has been established between London and Rome, a distance of 1,100 miles.

While conversation between the two cities is not yet easy, in the tests made by the telephone experts of London, disjointed words have been heard, and it is hoped that further experiments will soon bring about the required improvement in transmission.

The longest distance for effective telephoning from London is at present to Marseilles, a distance of 800 miles.

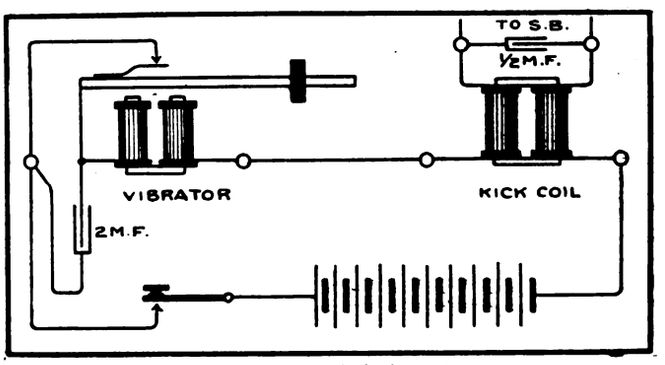
A HOME-MADE RINGING DEVICE.

By L. GOETH.

IN the small exchange where the hand generator is the only source of ringing current, an exceedingly simple and economical device can be made for furnishing this current from the following description.

The materials required are: A vibrating bell; two condensers, one ½ M.F. and one 2 M.F., one push button switch and a kick coil such as is used in telephones in place of a generator. The gong and tapper ball of the bell must be removed and a piece of number 12 iron wire, 5 inches long, soldered to the tapper rod. Upon this place a light weight which can be moved up or down to govern the speed of the vibrator.

Screw the vibrator and kick coil to any convenient base and arrange the circuit as shown in the sketch. Place the push button switch in a convenient position, preferably near the crank of the hand generator. Connect the ½ M.F. condenser across the terminals of the secondary winding of the kick coil, and the other condenser across the make and break contacts of the vibrator.



Circuit arrangement of ringing apparatus.

When the operator rings, pressing the switch closes the battery through the primary circuit of the kick coil and vibrator, this causing the secondary of the coil to deliver an alternating current. The ringing cam is operated in the usual manner.

While this may be crudely designed from an electrical standpoint, it will be found to give little or no trouble, and is cheap in cost and maintainance, ten cells of battery being sufficient for ringing purposes. Dry cells can be used as the circuit is open except the short time while the operator is ringing.

The kick coils can be purchased from any of the several companies which manufacture this style of telephone.

We have one in a farmers' exchange which has farmer lines from 8 to 10 miles long, with from 8 to 15 telephones on a circuit, and 10 cells of battery connected in series does the work well.

Editor's note.—We should be glad to have our readers comment on the amount of battery necessary to ring on a well loaded farmers' line.

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DRIVE —— AND —— **TWIST**

45 Seconds — 15 Seconds

NO INSTALLING EXPENSE — NO SLACK LEADS

The ONLY Anchor that can be installed in rocky soil.
The ONLY Anchor that does not give when the strain is put on,
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Every time you use or buy telephone construction iron, remember I am the maker of the "BULL TONGUE" Land Anchor, and also sell everything else in telephone construction iron.

My Anchor is the best and cheapest made. It is easier and quicker to instal, and holds better than any made.

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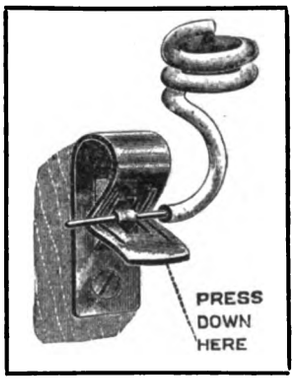
JUST TAKE

a dozen batteries with the regular connections on them and unscrew the nut from the zinc connector.

Take it all the way off and then notice how many of the screws are nice and bright and clean as they ought to be if you are to get all there is in that battery out of it.

You won't find a great many that are and you can bet the inspector doesn't brighten them before he attaches the wire.



The contacts are always bright and clean with the

Fahnestock Spring Binding Post.

They have to be: they are made in such a way that the air can circulate all around them and the dirt from the battery can't get up to them.

That's one reason why you ought to specify Fahnestock connector on your batteries when next you order. The cost will be no more.

Send for sample post. Its free.

Fahnestock Transmitter Co.

132 Havemeyer Street, BROOKLYN, N. Y.

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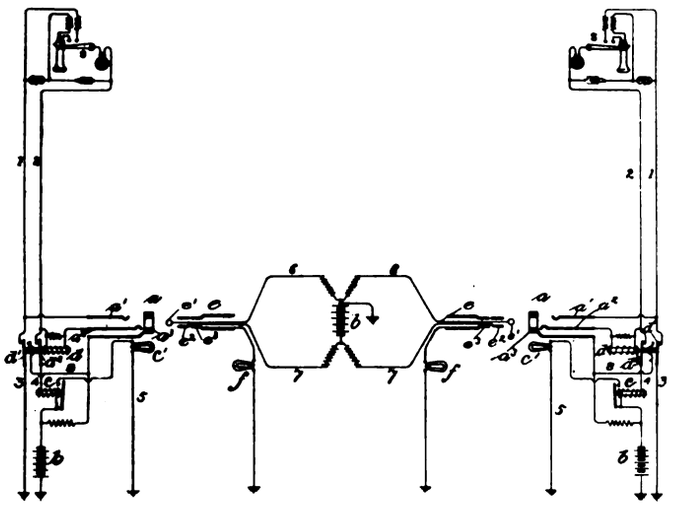
TELEPHONE PATENTS

EXCHANGE APPARATUS.

Frank R. McBerty, of Evanston, Ill., patents (No. 795,553; dated July 25, 1905; filed Sept. 28, 1903; serial No. 174,900, and assigned by mesne assignments to Western Electric Company, of Chicago, Ill.) telephone exchange apparatus.

This consists of improved and simplified apparatus for controlling the automatic signals at the central office. The line signal apparatus at the central office is included in one branch



of the line, controlled by the contacts of a cut-off relay, whose magnet is included in the circuit of another branch. By this means the cut-off relay is included in the path of current controlled by the sub-station switch and acts to disconnect the branch containing the line signal apparatus.

Another feature is means by which a supervisory signal is brought temporarily under the control of said relay. In the sketch, each line consists of two conductors, 1, 2; these lead to the line springs a^1 a^2, respectively, or to a. The usual telephone switch s is provided. At the central office the central battery wire b and line relay c are included in a branch, 3, 4, of the line circuit, which is controlled by d^1 d^2 of a cut-off relay d. The magnet of d is found between the spring a^2 and the branch connection 3, 4, which contains the line signal controlling apparatus. When the subscriber calls the lamp c^1 signals. The operator's plug then operates the relay d, cutting out 3, 4. When the subscriber is through, the relay, by means of the telephone resting on its hook, operates again, breaking shunt 8, 3, and thus makes the supervisory lamp burn brightly, as claimed.

MULTIPLE SWITCHBOARD.

Milo G. Kellogg, of Chicago, Ill., patents (No. 800,160; dated Sept. 26, 1905; filed Nov. 30, 1891; serial No. 413,606; and assigned by mesne assignments to Kellogg Switchboard and Supply Co., of Chicago, Ill.) a multiple switchboard for telephone exchanges.

This invention relates to a telephone exchange system in which the lines are each connected to a metallic switch terminal at each board adapted to receive and make contact with a switch plug which is inserted. It consists of a system of calling, switching, testing and clearing out connections. This is accomplished in brief, by means of a pair of switch plugs and two calling keys, one for each plug, each having a lever connected with the plug by a flexible conductor, etc.; certain contact points, a clearing out annunciator and retardation coils, by means of all of which conversation over two particular lines is not interrupted, as claimed.

TRANSMITTER ARM.

Jules A. Birsfield, of Rochester, N. Y., patents (No. 799,137; dated September 12, 1905; filed February 13, 1905; serial No. 245,525, and assigned by mesne assignments to Stromberg-Carlson Telephone Manufacturing Company, of Rochester, N. Y.) a transmitter arm.

The invention consists of a transmitter arm made up of two relatively movable parts, one for attachment with the transmitter, and the other to be held by the supporting object. Frictional engagement between the cup-shaped part and hollow spherical head forming the features of the arm, give steadiness and security when in use. The degree of friction can be varied by adjustment in this form of apparatus.

TELEPHONE SYSTEM.

William W. Dean, of Chicago, Ill., patents (No. 794,702; dated July 11, 1905; filed May 27, 1901; serial No. 62,032; and assigned by mesne assignments to Kellogg Switchboard and Supply Company, of Chicago, Ill.) a telephone system.

In this invention subscribers' telephone lines, centering at one or more offices, may be connected together for conversational purposes. It refers principally to those systems employing central batteries for automatically signaling from subscribers' stations to the central office.

The subscribers' lines are provided with a plurality of cut-off relays unresponsive to the calling current in the line. In Fig. 1

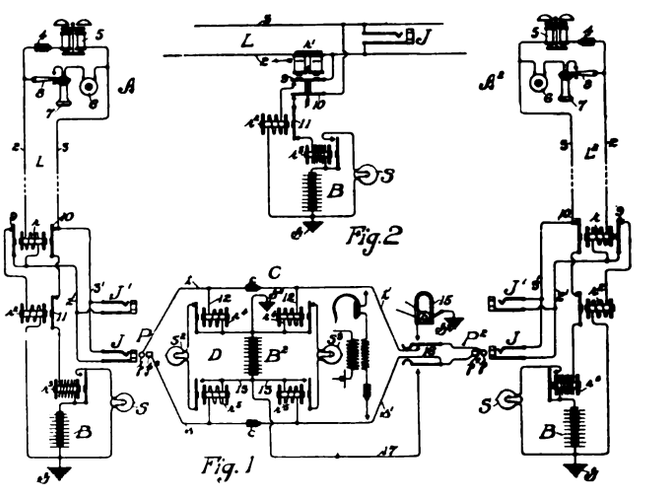


Fig. 1

L and L^2 are subscribers' lines extending from the subscribers' stations A and A^2 to the central office C. At these stations the line conductors 2 and 3 are connected together by a permanent branch conductor, including in series the condenser 4 and the standard signal bell 5; the transmitter 6 and receiver 7 being in a bridge of the circuit, normally opened by the telephone hook and closed when the receiver is removed.

The relays r and r^2 are unresponsive to a calling current in the line. The line relay r^3 is sensitive to such. In the operation of the system the subscriber closes his line circuit by removing the receiver from its hook; only the sensitive relay r^3 will be actuated and close the lamp circuit S. The operator puts plug P into jack J, closing a local circuit through to G. After signaling the subscriber wanted, the operator connects both circuits, if the line is idle, connecting to the second subscriber.

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You Will Find It Pays To Test

your lines periodically for insulation and resistance. This can be best done with a Volt Ammeter. Mine are especially designed for this branch of telephone work and are low in price.

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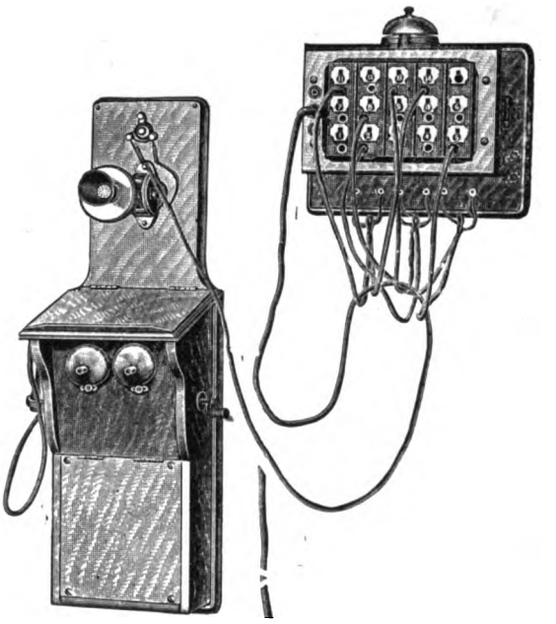
Originator of the Voltmeter Habit. **78 CORTLANDT ST., NEW YORK**

The United Telephone and Switchboard Co.

Succeeding the Gemmill Telephone & Mfg. Co., recently damaged by fire, have moved into their commodious and modern factory. All apparatus is of the highest grade construction and guaranteed for five years.

If you wish to secure the best possible service you must have the best apparatus. Send for catalogue, prices and sample telephones for inspection and test.



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Write for our booklet.

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Our Four-Party Selective Telephones Are Dividend Payers for Telephone Companies

We have but recently added to our long list of exchanges the following, who are using our system exclusively: **Mississippi Valley Telephone Co., Keokuk, Iowa; Fort Madison, Iowa; Burlington, Iowa; Wapello, Iowa; Morning Sun Telephone Co.,** Morning Sun, Iowa; **West Liberty Telephone Exchange,** West Liberty, Iowa; **Garden City Telephone Exchange,** Garden City, Kansas; **Johnson Telephone Co.,** Iowa City, Iowa; **Cedar Rapids & Marion Telephone Co.,** Cedar Rapids, Iowa, and **Burlington Rural Telephone Co.,** Augusta, Iowa. We also make a selective extension bell which you can use on your old telephone. We are always pleased to answer any inquiries or give any information regarding our system.

MODEL ELECTRIC CO., 204 NORTH MAIN STREET BURLINGTON, IOWA

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IN THE MANUFACTURING FIELD

"SUCCESS LIES IN THE KNOWLEDGE OF OUR TOOLS"

DEAN OPERATOR'S TELEPHONE EQUIPMENT AND ARRESTER STRIP.

FOR an operator to work at the highest point of efficiency it is necessary that she should not be hampered by unnecessary movements, and her hands must be free to manipulate the cords and keys. For this reason the breast plate transmitter was devised. This design of a talking set overcomes the objection to the suspension of the transmitter to the switchboard, which necessitates its being held in the hand, in case the operator has to reach outside of a position to answer a call. In the accompanying illustration, Fig. 1, is shown the Dean Electric Company's operator's breast plate transmitter equipment. As the framework is aluminum, the transmitter is very light. The supporting strap is adjustable, as is also the mouthpiece. The transmitter cord is silk-covered, and so made as to prevent loose connections or breakage when it enters the jack. The cut-in jack, Fig. 2, is provided with two jacks, the extra one being for emergency use or for a learning operator to listen in. It is provided with make and break contacts, so that when the plug is taken out the battery circuit is opened, to prevent a waste of current when the operator leaves the board. The arrester strip shown in Fig. 3 embodies a new principle in design. The fuses are tightly gripped in a special clamp, which is positive. The metal parts are securely fastened by means of hollow nuts, so that a reliable electrical connection is secured. This arrester is made up in strips of ten for metallic lines, or for twenty common return circuits. They are mounted on channel iron frames, which are made in suitable capacities to fit the requirements of a system.

This apparatus is further described in Folder No. 6, which can be obtained by addressing the Dean Electric Company, Elyria, Ohio.

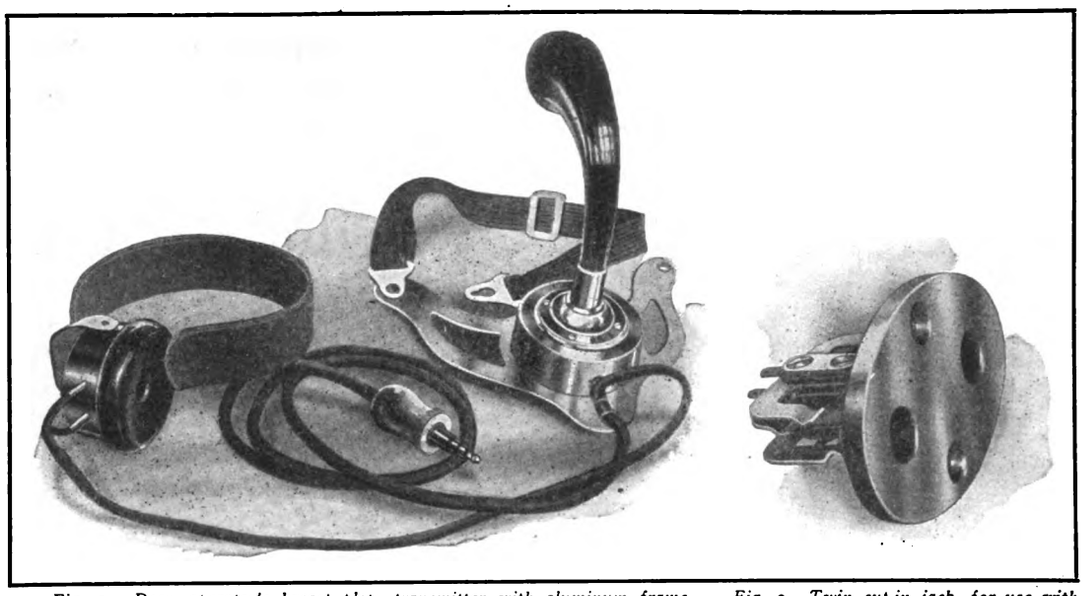

Fig. 1. Dean operator's breast plate transmitter with aluminum frame.

Fig. 2. Twin cut-in jack, for use with operator's set shown in Fig. 1.

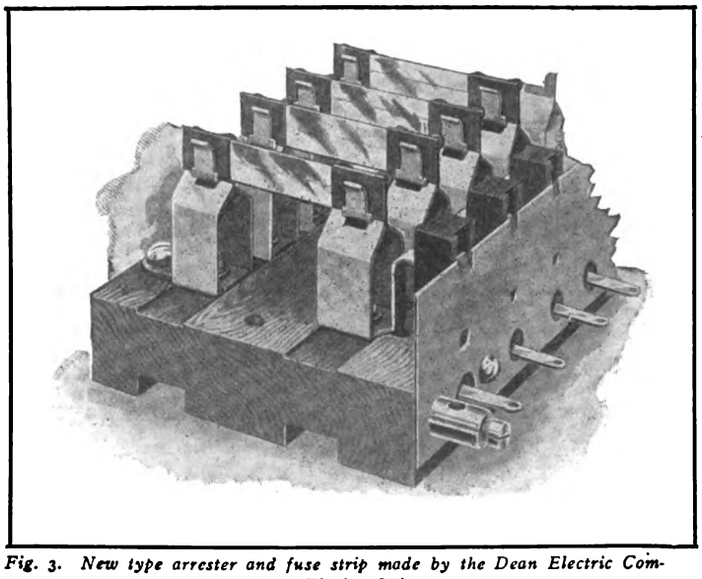

Fig. 3. New type arrester and fuse strip made by the Dean Electric Company, Elyria, Ohio.

THE ELECTRIC APPLIANCE COMPANY, Nos. 92 and 94 West Van Buren street, Chicago, is issuing a folder giving the prices of its slow-burning and weather-proof wires. Prices are given for three lines of wires. O. K. weather-proof wire has a triple braided covering, all three braids being saturated with a black weather-proof compound, and the outer one is smoothly polished. Slow-burning weather-proof wire is triple braided. The two inside braids are saturated with white fireproof compound, and the outer covering with black waterproof compound, which is smoothly polished. Slow-burning wire, formerly known as "Underwriter's" wire, has three braids, all saturated with a white fireproof compound, with the outside covering smoothly polished. Other lines of wire manufactured by this company are also mentioned. The list will be mailed by the manufacturers on receipt of a request.

THE DAYTON MANUFACTURING COMPANY, Dayton, Ohio, is distributing Bulletin No. 131, which describes Silvey storage battery systems. Information is given respecting the number of cells to install for lighting purposes, together with sizes and instructions as to proper location of battery and power board. Diagrams are shown for the connection of the various circuits to the switchboard for different types of installations. Prices are given for the different types and directions furnished for setting up the cells. The bulletin will be mailed to interested parties.

THE ROGERS TELEPHONE AND ELECTRIC COMPANY, Danbury, Conn., is distributing a booklet which describes three types of its interior telephone systems. An automatic switchless design is shown in both wall and desk sets. The circuit arrangements are

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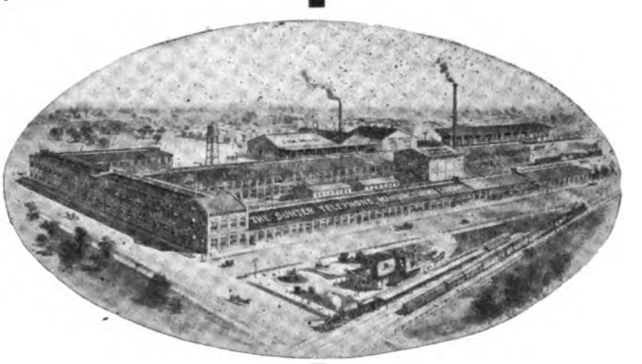
We are not offering the assembled product of nondescript makes, put together by boys—but the best equipment it is possible to build in one of the largest and most complete plants in the country.

Our phones are therefore known to be "good as gold" and



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This means much to us and will to you if you will allow us to send you a trial order. We carry an immense stock for *immediate delivery.*

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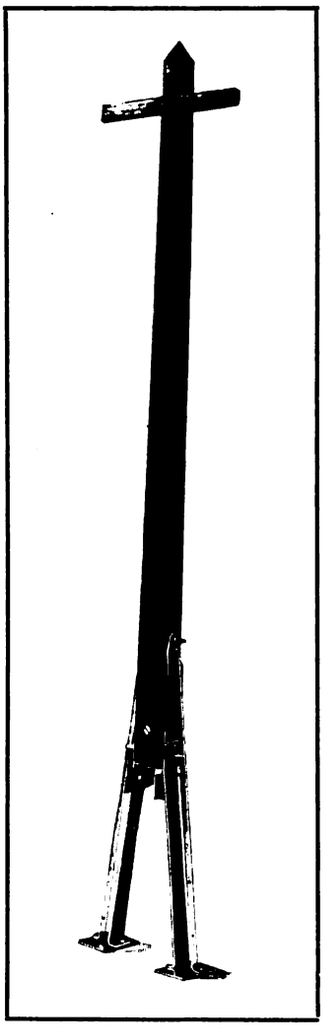
such as to enable a station to be called with the receiver on or off the hook, any number of buttons may be pressed simultaneously, and two or more stations may be engaged together without interference. The transmitter is the R. T. long distance, and the receiver double-pole self-contained. A wall switching instrument is shown which employs the usual radial switch arm. The desk instrument for this type of service has the switch arm and contacts mounted on a quartered oak block, to which connection is made by a light silk covered cable. Push button instruments for wall or desk are illustrated and described. Prices are included for all types. In addition to these types of apparatus the firm manufactures a complete line of magneto, private line and special telephones, full descriptions of which will be mailed upon request.

A METHOD OF PROLONGING THE LIFE OF WEAK POLES.

SOME time ago an elaborate investigation of the causes of failure of poles was carried on by the Bureau of Forestry, in co-operation with the American Telephone & Telegraph Company and the Postal Telegraph Company. This investigation brought out the fact that nearly every case in which the pole failed to carry its load was due to a break close to the ground line. Failure at this point is caused by a process of decay which occurs within the limits of a space extending only a few inches above and below the surface of the earth.

It follows that any appliance which will strengthen the pole at this critical point will be the means of materially prolonging its period of usefulness. Such a device is provided in the metallic pole and post anchor illustrated on this page, for which a patent has been granted to W. W. Hill. This device is intended to provide mechanical bracing for the pole on the two sides which are not supported by the tension of wires and the ordinary method of guying.

The device consists of a ground plate made of boiler iron, which is set at the base of the pole. From each side of this plate a bar of channel iron seven feet long extends at an acute angle to a point on the pole four feet above the ground, and then for three feet along the pole, to which it may be securely bolted. Additional bracing is provided, which, in connection with the main channel bar, forms a truss designed to form a most effective support.



Metallic pole anchor, with pole cut away to show method of attachment.

This arrangement can be readily installed at any time by one man, without disturbing the pole. The iron work is thoroughly galvanized, and is said to be capable of resisting rust for a very long time. Its use seems to offer especial advantages in economy in cases where a few poles on a line have become unduly weakened, and the condition of the line as a whole does not warrant the expense of reconstruction. Further particulars will be furnished on request by Warren W. Hill, Schoolcraft, Michigan.

THE TOLEDO INTERLOCKED FIBRE COMPANY has been incorporated with a capital of $150,000. The incorporators are Joseph M. Grasser, George Raab, E. J. Marshall, H. W. Fraser and George C. Bryce. The company will manufacture telephone receivers and other articles from wood fibre, using a process invented by J. M. Grasser. Negotiations are pending for the purchase of the recently vacated automobile plant of the Kirk Manufacturing Company, which, if the deal is closed, will give the company very commodious quarters.

G. M. GEST, subway contractor of New York and Cincinnati, has been awarded a contract for the construction of a complete electrical subway system for the Dayton Lighting Company, Dayton, Ohio. This plant has recently been acquired by new interests, which are rebuilding and re-equipping the entire plant. The contract is for subway installation for the whole city, covering twenty miles of streets, and involving over one million feet of conduit. The system is to be absolutely modern and up to date. The amount involved will be in the neighborhood of $250,000.

LOUIS M. PIGNOLET, 78 Cortlandt street, New York, reports a continually increasing demand for his volt and ammeters. These instruments are specially designed for testing lines and batteries in a rapid and accurate manner. In the continuous current type volt-ammeter the dial is provided with three scales, one to read from zero to 130 volts, one from zero to 6 volts, and one from zero to 14 amperes. The cases are finely finished and nickel plated. To parties interested further particulars and prices will be mailed upon request.

THE MONARCH TELEPHONE MANUFACTURING COMPANY, Chicago, is placing on the market an arrester rack for magneto boards which possesses several desirable features. It is constructed in sections for five metallic lines. All connectors, carbon holders, etc., are made from heavy brass. The fuse clips are new in design and insure a positive contact at all times. The ground strip is made from a broad piece of brass slotted at one end and provided with a screw at the other to connect to other sections. In the middle of each section is an insulated screw clip for holding the cross connecting wires and the cross connecting terminals are provided with both screw and solder connectors. This board is fully described in the new catalogue, which will be mailed upon request.

THE SCHAPER CONSTRUCTION MATERIAL COMPANY, No. 136 Liberty street, New York, desires to call attention to its exceptional facilities for shipping all kinds of construction material. This firm makes a specialty of line hardware, and is prepared to furnish quotations for any quantities of lag bolts, fetter drive screws, crossarm braces, pole steps, marline hangers, nuts, washers, eye bolts, etc. Free estimate blanks are furnished to enable a comprehensive and accurate record to be made of all material required.

THE ROCK ISLAND BATTERY COMPANY is mailing a notice of the removal of its plant from Rock Island, Ill., to No. 456-462 East Sixth street, Cincinnati, Ohio. It has secured at this location 40,000 square feet of floor space and has equipped the plant with the latest improved machinery. After October 20 all communications should be mailed to the new address.

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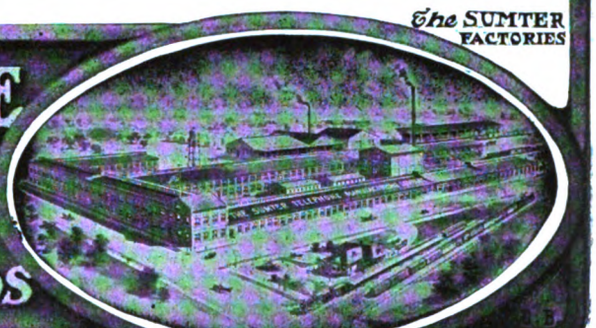
SOME PEOPLE THINK

that because Sumter apparatus is so much better than others its initial cost is too great for them.

Such is not the case. Large production has enabled us to reduce the individual profit on each telephone to a minimum. It should always be borne in mind that it is the maintenance expenses of a telephone line that reduce revenue and fathers cuss words. "SUMTER QUALITY" is more than simply a phrase. You had better get some and see.

The SUMTER FACTORIES



THE SUMTER TELEPHONE MANUFACTURING CO.

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TELEPHONES, SWITCHBOARDS

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IF YOU WILL GET OUR PRICES

before ordering telephone supplies, wire, and construction material, you will save money. We are manufacturers, and we ask only one profit—our own. It's not fair for the consumer to pay a manufacturer's and also a jobber's profit.

And bear in mind that we treat you "right," and we ship promptly.

It costs only a two-cent stamp to learn about our methods.

Write!

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THE WEEK'S MESSAGES

FINANCIAL.

GRAND RAPIDS, MICH.—The Citizens' Telephone Company of Grand Rapids, which has exchanges in several cities of the State, including Lansing, has filed amended articles of incorporation increasing its capital stock from $2,000,000 to $3,000,000.

BEARDSLEY, MO.—The Gopher State Telephone Company has filed an amendment increasing its capital stock to $50,000.

TOLEDO, OHIO.—Stock of the Home Telephone Company of Toledo was bid up to 69½ on the Toledo Stock Exchange last week with but few offerings.

BELLEVILLE, WIS.—The Belleville Telephone Company has increased its capital stock to $10,000.

FRANCHISES.

MARYSVILLE, CAL.—The Independent Telephone Company of Wheatland, Cal., has been granted the privilege of establishing a toll office in Marysville.

OAKLAND, CAL.—The Home Telephone Company has been granted permission to bid on a franchise.

DOYLESTOWN, PA.—J. C. Preban, representing the Consolidated Telephone Company of Pennsylvania, has applied for a franchise.

M'KINNEY, TEX.—The Blue Ridge Telephone Company of Blue Ridge, Tex., has been granted a franchise in McKinney.

COMBINATIONS.

MOBILE, ALA.—The Home Telephone Company, which recently provided for a long distance service and extensive improvements by issuing bonds to the extent of $300,000, has absorbed the Eastern Shore Telephone Company, which operates lines to Bay Minette, Magnolia Springs, etc. The company will at once spend $20,000 in improving the system. The improvements will include five trunk lines. The absorbed system will be operated from the main office in Mobile.

COLORADO CITY, COL.—C. D. Pickett of Wray, Col., has secured the claims for which the El Paso Telephone Company was recently sold under a chattel mortgage and is now in exclusive control.

PADUCAH, KY.—The Paducah Home Telephone Company, which is to take over the plant of the People's Independent Telephone Company, is to spend $50,000 in improving its system.

KANSAS CITY, MO.—The Kansas City Home Telephone Company is to purchase the following exchanges: Humboldt, Thayer, Erie, St. Paul and Galesburg. It will also ask for a franchise in Chanute.

BUFFALO, N. Y.—The Frontier Telephone Company of Buffalo has bought the Salamanca Telephone Company.

BOWLING GREEN, O.—The Wood County Telephone Company and the North Baltimore Telephone Company were merged into one company recently.

LAWTON, OKLA.—The Snyder Telephone Company has purchased the Topeka & El Reno Company's interest in Snyder.

HURON, S. D.—The Dakota Central Telephone Company has acquired the local exchange at Pierre.

TOLAR, TEX.—O. P. Kiker has purchased the business of the Tolar Telephone Company.

WEATHERFORD, TEX.—The Riddall Telephone exchange has been purchased by Chas. Clark and J. R. Thomas. Connection is to be made with the Fort Worth Independent exchange.

ELECTIONS.

SIOUX CITY, IA.—At the annual meeting of the stockholders of the Sioux City Telephone Company the old board of directors was re-elected. The board consists of T. A. Thompson, E. W. Rice, D. S. Lewis, F. L. Eaton, W. P. Manley, Howard S. Baker and George C. Scott.

LITTLE VALLEY, N. Y.—The Little Valley Telephone Company has elected the following officers: A. E. Darrow, president; E. M. Marrill, secretary, and S. N. Wheaton, treasurer.

NEW COMPANIES.

SELMA, ALA.—Business men of Thomaston, Marengo County, are interested in a proposed telephone line to be built between that city and Selma, Myrtlewood, Linden and Consul.

CANE HILL, ARK.—The Boonesboro & Stillwell Telephone Company has changed its name to the Cane Hill & Stillwell Telephone Company, and has increased its capital stock to $10,000. It is to construct a line from Cane Hill, through Clyde, to Dutch Mills, with the privilege of constructing other lines in Washington County and the Indian Territory. B. J. Parker is president.

LEWISTON, IDAHO.—The Lewiston-Clark Home Telephone Company has been incorporated with a capital stock of $50,000. C. F. Osmers of Lewiston is president and E. L. Alford of Lewiston is secretary and treasurer. It is estimated that the new system which the company is to build will cost about $30,000.

METROPOLIS, ILL.—A new telephone company has been organized in Metropolis with the following officers: J. M. Stapleton, president; L. F. Parrish, vice-president; W. Bixby, secretary, and M. Phelps, treasurer.

TAYLORVILLE, ILL.—The Christian County Telephone Company, Taylorville, Ill., has been incorporated with a capital stock of $10,000. Incorporators: W. W. Taylor, W. B. Adams and R. K. Williams.

TRAER, LA.—The United Exchange Company has been incorporated and will take over the telephone franchises and properties now owned by Parker & Shoemaker. The company will acquire the Traer, Reinbeck and Gladbrook exchange, and toll lines extending to Clutier, Buckingham, Dysart, Berlin and Garwin. The company is capitalized at $35,000. President, John Stewart; secretary and treasurer, J. H. Shoemaker; manager, R. L. Parker.

CALDWELL, KAN.—The Farmers' Mutual Telephone Company has been incorporated with a capital stock of $800. The company is to build rural lines.

BALDWINSVILLE, MASS.—The Otter River Telephone Company has been incorporated. Capital stock, $1,000. It is the company's intention to establish an exchange at Baldwinsville and to install telephones in the four villages of the town of Templeton.

ALBANY, N. Y.—The Great Eastern Telephone Company has been incorporated with a capital of $1,000,000. It intends to operate in and between the cities of New York, Albany, Syracuse, Rochester, Buffalo and other cities and villages in the State. The line is to connect with the lines of other telephone companies in the United States and Canada. The directors are: Wm. H. Schlack, Eugene H. Brock, Elias J. Beach, Egbert A. Reynolds, E. A. Reynolds, William Myron Reynolds of New York city and Stephen M. Conger of Brooklyn, N. Y.

ASHFORD, N Y.—The West Valley Telephone Company, Ashford, Cattaraugus County, has been incorporated with a capital stock of $3,000. Directors: F. E. Link, L. Fish, Harvey Vedder, Ashford.

ELLICOTTSVILLE, N. Y.—The Home Telephone Company of Ellicottsville has been incorporated with a capital stock of $10,000. The following are the directors: T. S. Lane of Jamestown, W. B. Page, Frederick L. Keith, Walter Page, A. M. Ellis, Geo. W. Houck and Eugene Rust of Ellicottsville.

LITTLE VALLEY, N. Y.—The Citizens' Telephone Company of Little Valley has been incorporated with a capital stock of $30,000. Incorporators: A. E. Darrow, Little Valley; Edward Boland, Salamanca; E. B. Kelley, Little Valley, and others.

AUSTINBURG, O.—The Austinburg Telephone Company has been incorporated with a capital stock of $5,000. The incorporators are: F. M. Houghlaling, Tracy D. Herrick, G. H. Webb, M. B. Andrews and W. W. Barnes.

PETTISVILLE, O.—The Mutual Telephone Company has been organized. Construction work will begin this fall.

MARYSBURG, O.—The Tonawanda Valley Telephone Company has been organized at this point.

CONEMAUGH, PA.—The Citizen's Telephone Company has been organized by the farmers of Quemahoning and Conemaugh townships, Somerset County. The plan is co-operative, and thirty or more proposed lines will connect with the central exchange of the Johnstown company through a sub-station located in Conemaugh.

NEWS—WANTED

THE matter contained upon the Message and Operating Field pages of this paper is contributed largely by our special correspondents. We believe, however, that there are many valuable items of telephonic interest which are never brought to the attention of the public. There is no reason why this condition should exist, and the Editor, therefore, invites all telephone companies, and the officials of such companies, to furnish any information that they can consistently make public relative to financial statistics, new construction, elections, franchises and personal items.

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Wholesalers of **Michigan White Cedar** **POLES** *of* **QUALITY**

Five Yards ***Prompt Shipments***

PITTSBURG & LAKE SUPERIOR IRON CO.,
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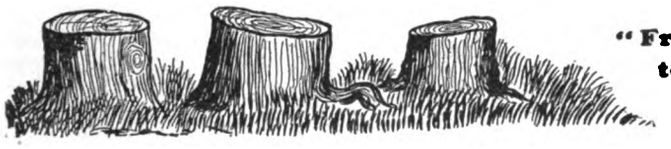
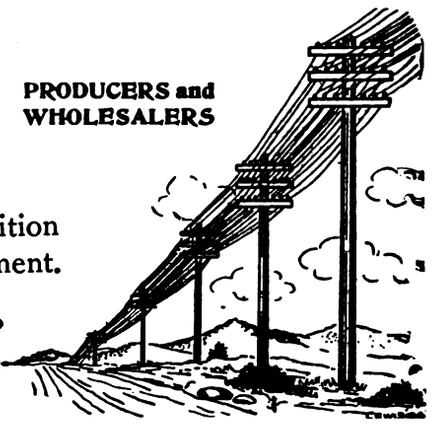
PRODUCERS and WHOLESALERS

WE always carry a large stock of all sizes of White Cedar Poles, and having yards on all principal railroads in Northern Michigan and Minnesota, are in position to make immediate shipment.



"From the Stump to the Line."



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Some Poles are Good;
Others are better, but the
Sand Point Cedar Company's
Are the BEST.

Because our location enables us to
Cut only that timber which has the
Necessary qualifications of
Soundness, Strength and Straightness.

Hadn't you better write us for
Quotations upon Superlative
Quality Cedar Poles?
They cost no more than the other kind.

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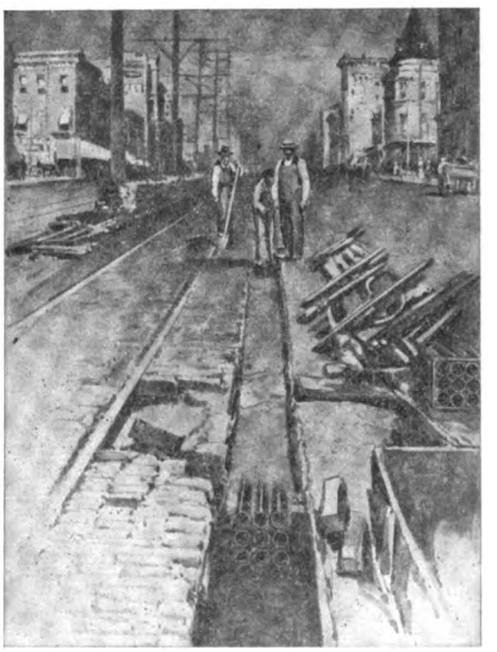
BITUMINIZED FIBRE CONDUIT
For Underground Construction



The American Conduit Company has a corps of experts in underground construction and is prepared to furnish supervision of work if desired. We would prefer to co-operate with contractors in underground construction, but if desired will submit estimates and bids and take contracts for completed underground systems in any part of the United States or Canada.

AMERICAN CONDUIT COMPANY,
Main Offices, 1005-6 Manhattan Building, Chicago
Other Offices, 170 Broadway, New York 336 Macy Street, Los Angeles

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THE WEEK'S MESSAGES

rectors: R. N. Allen and A. W. Phelps, Chaffee, Erie County; H. B. Freeman, Sardinia.

AUSTIN, TEX.—The Lagrange and Waldeck Telephone Company has been incorporated, to operate at Oldenburg, Fayette County. The capital is $10,000. Incorporators are: H. Amberg, Louis Voelkel, Charles Franz and others.

COMBINATIONS.

LOS ANGELES, CAL.—The exchanges at Long Beach, Ventura, Santa Ana, San Pedro, San Bernardino, Colton, Anaheim, Fullarton and Orange have been consolidated into one company known as the Consolidated Telephone Company, which will develop the territory.

MINEOLA, IA.—The Independent Telephone Company, of Council Bluffs, has purchased the telephone exchange at Mineola.

ROOK VALLEY, IA.—W. C. Moeller has purchased the telephone business of W. J. Skewis.

HEATH, MASS.—The Heath Telephone Company has purchased the Rowe Telephone Company. A line to Greenfield is contemplated by the Heath Company.

OWOSSO, MICH.—The Union Telephone Company, of Owosso and Alma, has purchased the business of the Mutual Company, at Fenton, and will install an entirely new system at that point.

PRINCETON, MINN.—The Tri-State Telephone Company has bought out the Maple Leaf Company of this place. New switchboards and lines will be put in.

E. AURORA, N. Y.—The Inter-Ocean Telephone Company has purchased the Elma and Parilla exchanges. The new line will be under the management of the local branch of the Inter-Ocean known as the East Aurora Telephone Company.

FRANKLINVILLE, N. Y.—The Franklinville Telephone Company has been purchased by the Consolidated Telephone Company of Buffalo. The new company will at once improve and extend its service, and will establish long distance connection within sixty days.

PERSONAL.

Under this heading we publish news respecting the appointment of managers of telephone companies and other officials of such companies. As we are anxious to increase the space devoted to this department, we would ask all parties who have made changes, or who contemplate making changes, to communicate with us.

JOHN WRATHER, of Detroit, has been selected by the Michigan State Telephone Company as manager of its exchange at Muskegon.

V. H. JAMESON, of Las Vegas, N. M., has been appointed manager of the El Paso Telephone Company.

A. E. HUNTLEY has been promoted by the Michigan Telephone Company to the control of its exchange at Ludington.

JAMES HOBBINS, of De Pere, has been made district manager of the Wisconsin Telephone Company at Green Bay.

CLEVE HEGLAND goes from the Freeborn County Rural Telephone Exchange to Albert Lea, Minn., where he will accept a position.

FRANK CANADY, formerly manager of the telephone exchange at Chicago Junction, has taken charge of the plant at Crestline, Ohio.

FRANK D. CROSS, of Corning, has been made district superintendent of the Century Telephone Company for the territory embracing Ithaca, Penn Yan, Waverly, Sayre, Athens, Bath, Addison, Watkins, Wellsville, Hornell and Canisteo.

WILLIAM L. HARPER has been appointed division manager for the Southern New England Telephone Company at Meriden.

R. B. NICHOLSON, formerly of Wabash, has been appointed local manager for the Bell Company at Goshen, Indiana.

GROVER PARKS has been appointed superintendent for the Wisconsin Telephone Company at Jefferson, Wis.

T. SCHAFER will be apopinted manager of the Ellis County Telephone Company at Ennis, Texas.

JUDSON SMITH has been appointed superintendent of the Anthracite Telephone Company, with headquarters at Fount City, Pa.

W. N. SPERRY has been appointed division superintendent for the Southern New England Telephone Company, with headquarters at Ansonia.

M. L. S. MITCHELL, who for the past two years served the Home Telephone & Telegraph Company of Los Angeles, California, in the capacity of service manager, resigned his position on October 15. Mr. Mitchell will take a few weeks of much needed rest before re-entering the telephone field.

MISCELLANEOUS.

GERMAN VALLEY, N. J.—The Chester Telegraph Company has completed its line to Middle Valley, Custmoor, Vernoy and Califon. At the latter place it connects with the Farmers' and Merchants' Telephone Company's line, giving service to High Bridge, Clinton, Flemington, Frenchtown, Whitehouse, Milford and Bloomsbury.

SALEM, OHIO.—The Columbiana County Telephone Company has installed a modern central energy toll board.

SAYRE, PA.—The Valley Telephone Company has installed a new switchboard having an ultimate capacity of 3,000 lines.

SEATTLE, WASH.—The Independent Telephone Company, of Seattle, is to spend $1,000,000 in extending and improving its system. Its lines will be extended into the principal cities of the Sound country.

GREEN BAY, WIS.—Regular telephone service has recently been inaugurated by the Fox River Valley Telephone and Telegraph Company. The company has exactly 419 telephones in working order in this city and has closed contracts for more than 700 bona fide subscribers.

New Construction in the Field

LOS ANGELES, CAL.—The Home Company has bought a lot for its new exchange, and work on changing over the entire plant to the automatic system will soon be started. Improvements are being planned also for its system at Hollywood.

BELVIDERE, ILL.—The Boone County Telephone Company is to install an exchange at Irene, and will make other extensions of its lines.

PETOSKY, MICH.—The Petosky Independent Telephone Company is to spend several thousand dollars in improving and extending its system.

ST. JOE, MICH.—The Twin City Telephone Company is to place its wires underground in St. Joe.

BARING, MO.—An Independent telephone line is being built from Baring to Hazelville.

BASSETT, NEB.—The Bassett-Springview Telephone Company is to build a line from Sybrant to Batka.

FREMONT, NEB.—The Fremont Telephone Company is enlarging its switchboard to enable it to take care of its increase of subscribers.

HENDERSON, NEB.—The York County Telephone Company is erecting a new office here.

HUDSON, N. Y.—The Columbia Telephone Company is extending its lines from Hudson to Kinderhook and Valatie.

OLCOTT, N. Y.—The Lakeside Telephone Company is to extend its lines to Appleton, from there to Barker, then to Lyndonville.

ONEONTA, N. Y.—The plant of the Home Telephone Company, which is being installed under the supervision of F. C. Ward is rapidly nearing completion and it is expected that service will be given about November 1.

TICONDEROGA, N. Y.—The Ticonderoga Home Telephone Company, as soon as its line to Crown Point is completed, will commence work on the lines to Schroon and Hague.

WAYNE, N. Y.—The Wayne-Monroe Telephone Company is to extend its lines towards Dublin, and will also build a line to Rochester.

GREENBUSH, O.—The Preble County Telephone Company is to make several more additions to its lines.

YANKTON, S. D.—The Independent Telephone Company, of Yankton, has commenced construction work on its extension of a long distance telephone line from Gayville to Sioux City.

MORRISTOWN, TENN.—The Citizens' Telephone Company, of Morristown, is extending its line from Galbraith Springs to Rogersville.

FORT WORTH, TEXAS.—The Fort Worth Telephone Company is making important extensions to its long distance system.

MILANO, TEXAS.—The H. R. F. Telephone Company will extend its lines from Milano to other adjoining points.

SCHULENBERG, TEXAS.—The Fayette County Telephone System will be extended to Weimer.

DE PERE, WIS.—The Valley Telephone Company is to build a line from De Pere to Appleton.

EMBARRASS, WIS.—The Matteson Telephone Company is to put in a new switchboard and make a general overhauling of its line.

NELSON, B. C.—The British Columbia Telephone Company is to entirely rebuild its system at Nelson. George C. Hodges, of Nelson, is district manager.

AYLMER, ONT.—The rural telephone line, under the supervision of Dr. Kingston, of Aylmer, will build lines to Port Bruce and Port Burwell.

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CENTURY

100 % GOOD

FOR PERFECT TELEPHONE TRANSMISSION

the receiver must be equally as efficient as the transmitter.

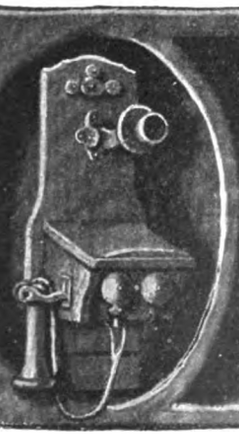
Our Perfection Receiver No. 11 is equally as good as our "Platinum Electrode" Transmitter.

This receiver embodies several entirely new features, greatly increasing its sensitiveness and reliability.

It is absolutely permanent in adjustment. The construction provides suitable protection against injury and the accumulation of dust.

This receiver will retain its original sensitiveness indefinitely, and with our "Platinum Electrode" Transmitter, makes the best talking set on the market.

We will send you one of these receivers, also a "Platinum Electrode" Transmitter, if you so desire, on trial, charges prepaid.



CENTURY TELEPHONE CONSTRUCTION CO.
332 ELLICOTT STREET
BUFFALO, N.Y.

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MONARCH SWITCHBOARDS

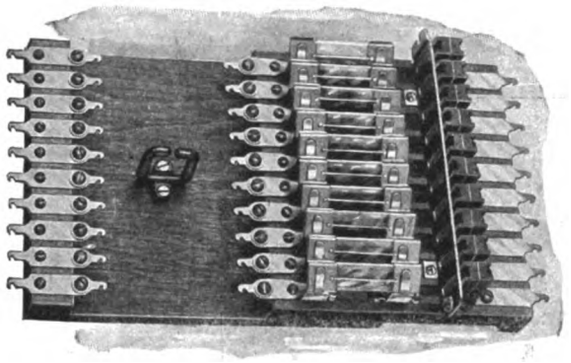
ARRESTER BOARD

A simple, convenient equipment for magneto exchanges.

Put up in sections of five metallic lines, each to correspond to drop and jack sections of the switchboard.

All connectors, carbon holders, etc., are made of heavy brass.

The fuse clips are of a new design. The clips holding the fuses may be bent if they become loose. A perfect contact is always insured.



The fuses are set at an angle. A blown fuse can be seen at a glance and a new one inserted without difficulty.

The ground strip is a broad piece of brass with a slot at one end and a screw at the other for connecting to other sections.

A slight pressure is on the carbons at all times. Perfect ground connections are thus provided.

The cross-connecting terminals are provided with both screw and solder connectors.

An insulated ring is mounted in the middle of each section for the accommodation of the jumper wires.

Substantial construction and good workmanship are apparent.

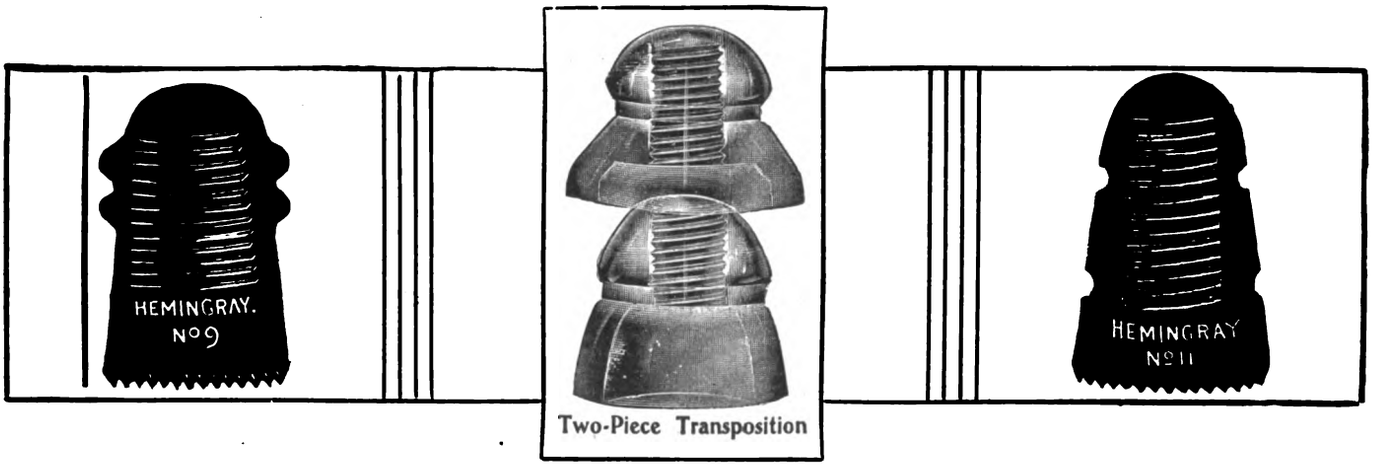
This arrester board and all other Monarch switchboard apparatus are fully described in the new catalogue. A copy will be mailed upon request.

MONARCH TELEPHONE MFG. CO.

10-16 SO. CLINTON STREET CHICAGO, U. S. A.

THE STANDARD "HEMINGRAY"

ALL WITH THE "PATENT DRIP PETTICOATS."



Two-Piece Transposition

THE HEMINGRAY-GLASS CO.

Office, Covington, Ky. **Factory, Muncie, Ind.**

ESTABLISHED 1848.

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DEAN TELEPHONE APPARATUS

ORIGINALITY

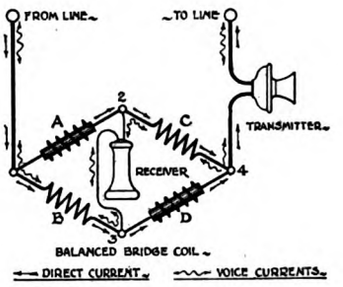

Fig. 1—Diagram of Our Common Battery Telephone Circuit.

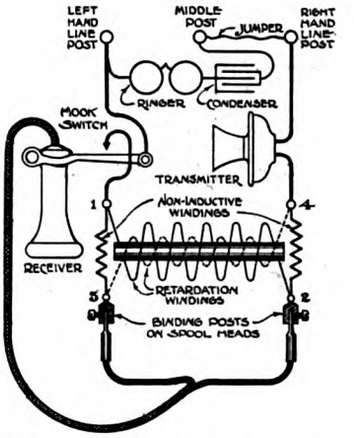

Fig. 2—Complete Wiring of Our Common Battery Telephone.

Our product has a *distinctive originality* in its design and make-up, especially along the lines of efficiency, simplicity and longevity.

Our common battery telephone circuit thoroughly exemplifies these claims.

Efficiency is obtained by direct action, there being no retarding effect in the path of the voice currents. The direct current from the exchange is prevented from flowing through the receiver by the use of a *balanced* Wheatstone's bridge, as shown in Fig. 1. Windings A and D have *high impedence* to voice currents, while B and C have no *impedence* and low ohmic resistance. Thus the incoming transmission is "forced" directly and undiminished through the receiver as indicated by the double pointed arrows.

Simplicity is due to the fact that all four of the coil windings are arranged on one spool, as shown in Fig. 2, and that only two terminals are necessary to connect the coil with the remainder of the telephone circuit. The receiver cord is connected directly to the coil windings by means of binding posts located in the spool heads. Furthermore, only one contact is required in the hook switch, and the condenser is eliminated from the talking circuit.

Longevity is made possible by the pieces of apparatus being very few in number and built right. We know this from experience.

The high efficiency of this circuit gives the best transmission obtainable, the extreme simplicity guarantees low maintenance cost, and the longevity insures a continuance of these valuable features.

Let us quote you prices on our telephones fitted with this circuit.

THE DEAN ELECTRIC COMPANY
ELYRIA · OHIO

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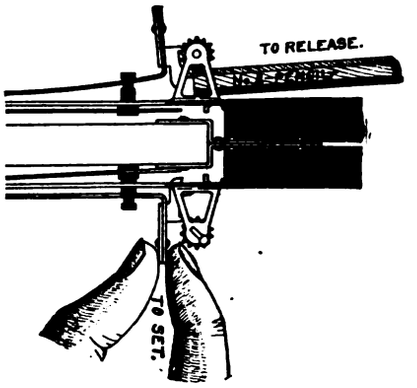
PERFECTLY SIMPLE

Instructions for Resetting Cook's No. 8
SELF SOLDERING PROTECTOR



GRASP END OF SPRING BETWEEN THUMB AND FINGER AND PULL SIDEWISE

SIMPLY PERFECT

Frank B. Cook. Mfr.

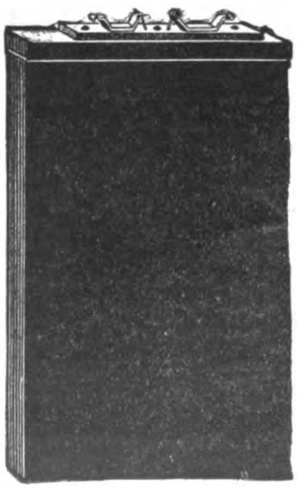
238W. LAKE STREET **CHICAGO, ILL.**

ANDRAE

TELEPHONE CONDENSERS OF MERIT

We pride ourselves upon the workmanship, quality and durability of our Telephone Condensers, going so far as to equip entire lines on trial—you to have the privilege of returning them if not satisfied.

We manufacture three distinct condensers in the following styles and guarantee each condenser of any make.



"STANDARD" TYPE XX

These condensers are of approved design and superior quality, due to their uniform capacity and ability to withstand high voltage without breakdown. Will withstand approximately 300 volts, alternating current, indefinitely. Made in the following capacities and sizes:

No. X-1, ¼ M. F. capacity, size 2½ x 3⅛ x 6½.
No. X-2, ½ M. F. capacity, size 2½ x 3⅛ x 6½.
No. X-3, 1 M. F. capacity, size 3½ x 5⅛ x 7.
No. X-4, 1½ M. F. capacity, size 4½ x 5⅛ x 7½.
No. X-5, 2 M. F. capacity, size 4¼ x 5⅛ x 7½.
No. X-6, 3 M. F. capacity, size 4¼ x 5⅛ x 7½.

No. X-2, ½ M. F. capacity, is the standard condenser for bridging telephones.

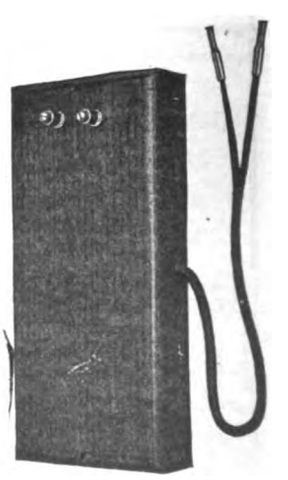
NO. 186 (Patented)

This is our new form of condenser, fitted in a handsome, quarter-sawed, oak case. Its construction is simple, yet durable. There is no necessity of employing an expert to install it, as that can easily be done by a novice. It is especially adapted for use in connection with telephones *already in operation.*

Outside measure, 8⅝ inches long, 4 3-16 inches wide, 1⅛ inch thick.

Our "Special" No. 225 is of compact form, permitting it to be installed in any bridging magneto box.

WRITE FOR PARTICULARS AND CATALOG NO. 11 TO-DAY.



Julius Andrae & Sons Company

99 West Water Street, Milwaukee, Wis.

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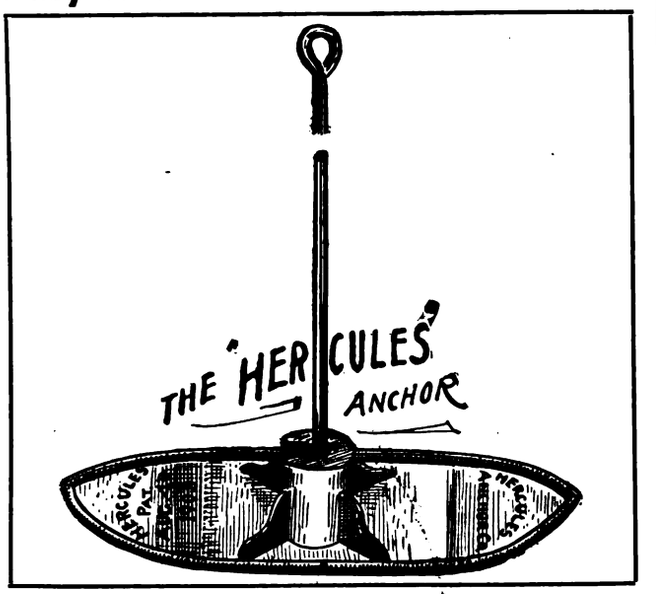
Easy to Set—Cannot be Pulled Out



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W. G. NAGEL ELECTRIC CO.

Manufacturers of "Ready" Specialties
for Telephone Exchanges

TOLEDO, ... OHIO

9/10 9/10 9/10 9/10 9/10 9/10 9/10

EVERY TIME YOU SEE

9/10 REMEMBER 9/10

of the Telephone Companies in United States and Canada who buy Pay-stations

Use Baird's. Do You?

If not, let us send one on trial

Send for Catalogue and Net Price List—Or still better. Send for a Pay-station on trial.

New Model Pay-station
1 to 5 Slot.

Baird Manufacturing Co.

6 Michigan Street, Chicago, U. S. A.

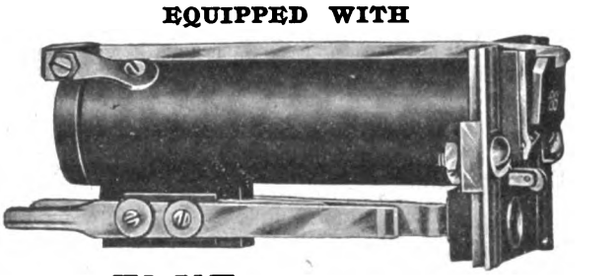
MAKERS OF BAIRD SECRET-SERVICE SYSTEM

A THING OF BEAUTY

THE

FI-NE SWITCHBOARDS

EQUIPPED WITH



The FI-NE Tubular Drop

WHICH, WHEN INSTALLED IN

The FI-NE Steel Frame

is *rigid* as a *rock*, and yet *removed* by the *loosening* of a *screw*.

PERFECT NIGHT-BELL CIRCUIT. NO CROSS-TALK—NONE

WRITE FOR PRICES OF FI-NE PONES

FISK. TRADE Fi-Ne MARK NEWHALL

CHICAGO

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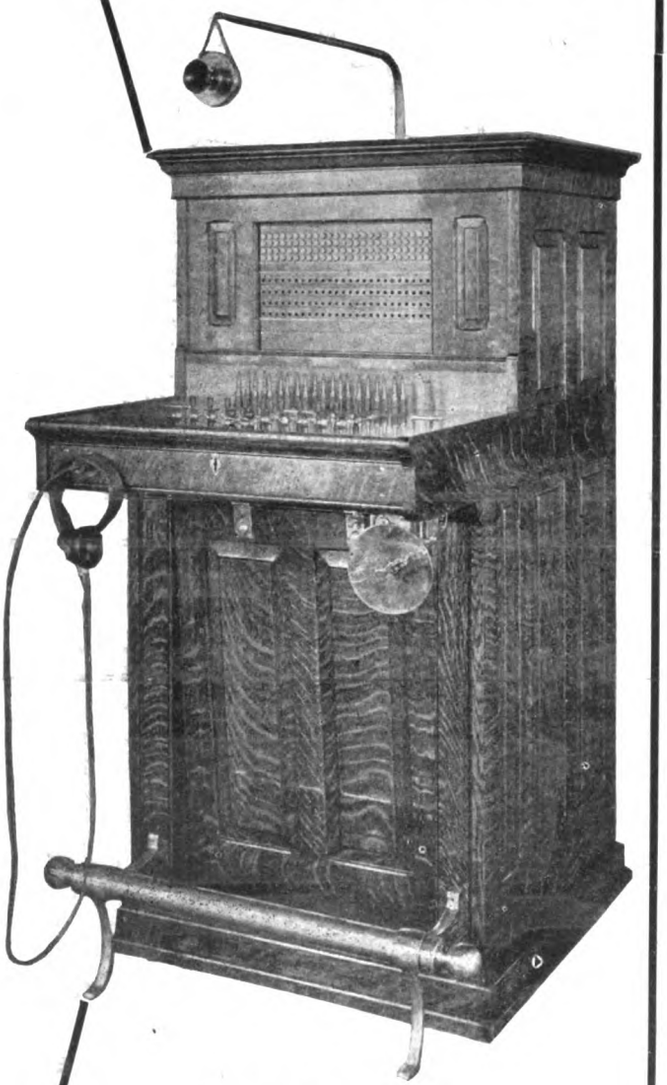
DON'T BUY HOT AIR

FOR A

SWITCHBOARD

Buy where you get a dollar's worth for every dollar invested.



We make the only

Lamp Signal Magneto Board

that can be changed successfully to

Full Common Battery

STERLING ELECTRIC CO.
LA FAYETTE, INDIANA

Here Are Some Facts for You to Remember

WE are able to quote you the lowest possible prices upon all kinds of line construction hardware.

WE have the most varied stock carried by any manufacturer or dealer.

EVERY article we have for sale is the best money can buy.

WE have had over twenty years' experience in selling this line of goods and therefore know what is wanted.

WE will furnish you with estimate blanks free of charge.

WE will give your order personal attention.

AND we will treat you right no matter how little or how much you buy.

The Schaper Construction Material Co.

Electrical Exchange Bldg.

136 Liberty St.

NEW YORK CITY.

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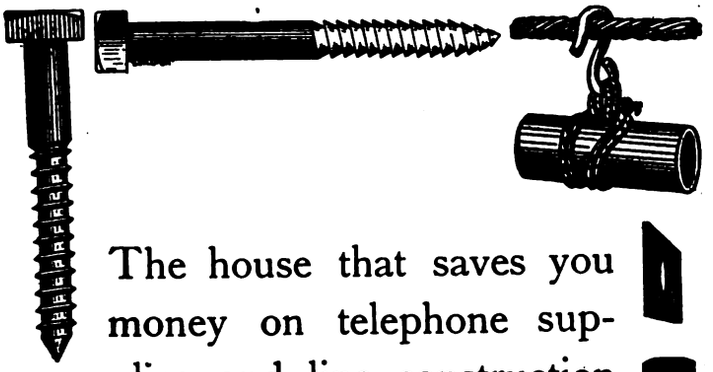

The house that saves you money on telephone supplies and line construction tools and specialties

We guarantee our goods and ship promptly

Place a "trial" order and see if it isn't so

Our Free Estimate Blank is a great help

Write us to-day

SCHAPER CONSTRUCTION MATERIAL CO.

Electrical Exchange Bldg.

136 Liberty St.

New York City

YOU DON'T KNOW

UNTIL YOU TRY

No. 18

We Take the Chance

No. 19

No. 16

GUARANTEED BETTER THAN THE **BEST** AND MAY SAVE YOU

MONEY

WE KNOW IT

STERLING ELECTRIC CO.

LA FAYETTE, IND.

Please mention THE AMERICAN TELEPHONE JOURNAL when writing to ADVERTISERS.

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STROMBERG-CARLSON

The Exchange Manager

Who Wants All the Business He Can Get

will be interested in our new bulletin on Intercommunicating Telephones. It is just such a book as you should have if there is anybody in your town or city needing a system of this kind—and there are. Give us their names, and with your assistance we can land a customer that will mean more rentals and increased dividends for your exchange.

We have the most convincing kind of evidence to offer you that our system is the one for you to put in, or have put in, if it is to be connected with your exchange by trunk lines. Some of our systems have not only been in use for a number of years, but parties using them have tried many others, and are consequently able to make a comparison based upon experience.

A. H. VILAS COMPANY,
MOULDINGS AND PICTURE FRAMES.

Chicago, September 21, 1905.

STROMBERG-CARLSON TEL. MFG. CO., Chicago, Ill.

GENTLEMEN:—In reply to your favor of the 19th, we beg to state that since writing you about two years ago, your telephone system which is installed throughout our factory and warehouse, has been in good working order. We have had your system now for nearly seven years, and it has always given entire satisfaction. We tried many others before that time, but always experienced more or less trouble in operating them.

Yours truly,
A. H. VILAS COMPANY.

Of course the systems we put in to-day are a decided improvement over those we built a number of years ago.

It is remarkable how few telephone companies have ever done anything with this class of apparatus. Why should its development be left to a few of the big Independent companies? Don't think because your exchange is in a small town you have no field to work. There are hundreds of towns in which are located factories, stores, hospitals, etc., that would put in a private system if solicited. Just write and say you are interested and see what we have to offer. We want you to have the bulletin in any event. A postal card as follows will bring it: "Send Bulletin No. 13-B."

TELEPHONE M'F'G. CO.
ROCHESTER, N.Y. CHICAGO, ILL.

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Write for the Cable Book!

Stromberg-Carlson Cable

It Will Post You How to Buy

We Mail It Free

Drop us a postal and just say "Send Booklet 79-B."

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THE COLUMBUS EVENING DISPATCH, WEDNESDAY, SEPTEMBER 6, 1905.

TELEPHONE SECURITIES IN GOOD DEMAND ON THE LOCAL STOCK EXGHANGE

Installation of the New System Has Greatly Stimulated Interest in the Company.

Caleb L. McKee & Co. say—"Columbus Citizens' Telephone preferred is in good demand at 103½, while nothing was offered below 105¼, and it seems quite firm at the latter figure. The installation of the new system has materially stimulated interest in this security and at the same time has had the effect of tightening it up to a considerable extent, as sellers are very scarce. "Columbus Railway common is call

Our automatic System;- always does it,— strengthens the securities and keeps them strong because there's value back of them. It will do the same for yours

OUR AUTOMATIC SYSTEM ADOPTED IN THE FOLLOWING CITIES:

Chicago, Ill.	Sioux City, Ia.	Van Wert, O.	Auburn, Me.	Woodstock, N. B.	Hastings, Neb.
Grand Rapids, Mich.	Cleburne, Tex.	Battle Creek, Mich.	Fall River, Mass.	St. Marys, O.	Wausau, Wis.
Columbus, O.	Columbus, Ga.	Clayton, Mo.	New Bedford, Mass.	Westerly, R. I.	El Paso, Tex.
Dayton, O.	South Bend, Ind.	Pentwater, Mich.	Los Angeles, Cal.	Manchester, Ia.	Havana, Cuba
Lincoln, Neb.	Aberdeen, So. Dako.	Toronto Jct., Can.	San Diego, Cal.	Princeton, N. J.	Marianao, Cuba, and
Portland, Me.	Miamisburg, O.	Wilmington, Del.	Hopkinsville, Ky.	Albuquerque, N. M.	Berlin, Germany.
Auburn, N. Y.	Medford, Wis.	Riverside, Cal.	Hazleton, Penn.	Allentown, Penn.	
Lewiston, Me.	Portland, Ore.	Traverse City, Mich.			

AUTOMATIC ELECTRIC COMPANY

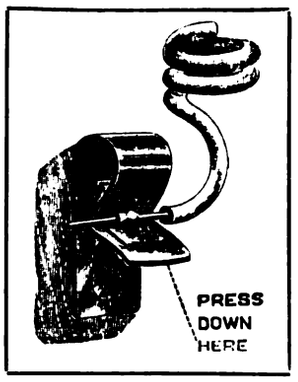
Van Buren and Morgan Streets, CHICAGO, ILL.

Ne Plus Ultra

is a Latin phrase which means no better. It is specially applicable to the

Fahnestock Spring Binding Post

which has no equal. This binding post holds the wire securely without damaging it in the least.



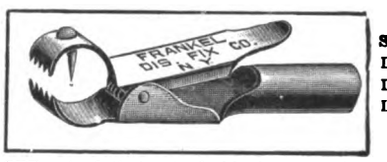
Quite frequently in tightening up a screw post the wire is cut through, or so weakened as to break off with the least jar. Again, screws work loose, which means poor circuit connections, cut outs and opens. The Fahnestock post can never work loose, nor can the wire become unfastened except when so desired. You can buy batteries equipped with the Fahnestock Spring Binding Post at no extra cost. If you use dry batteries order this post for your next lot, and see what a great improvement it is over the screw type.

Fahnestock Electric Co.

132 Havemeyer Street, Brooklyn, N. Y.

SAMPLE ON REQUEST

Frankel's Electric Testing Clip



Sample dozens...$1.50 per doz.
Lots of 100....11.00 per 100
Lots of 500....10.00 per 100
Lots of 1000.... 9.00 per 100

Patented Nov. 15, 1904.

GET out of that rut of skinning the wires—IT'S EXPENSIVE. THIS device will save both valuable time and material—THAT'S PROFIT.

The teeth grip the wire or binding post. The pin pierces the insulation and makes a perfect test connection.

FROM YOUR SUPPLY HOUSE, OR

FRANKEL DISPLAY FIXTURE CO.

718 BROADWAY, NEW YORK

Replace your wasteful
PRIMARY BATTERIES
with
SILVEY TYPE "R" STORAGE BATTERIES

which can be maintained at one fourth the cost. Far less trouble; Current always constant.

WRITE TO US DESCRIBING YOUR PRESENT BATTERY EQUIPMENT AND WE WILL SEND OUR VALUABLE CATALOG No. 126.

THE DAYTON MFG. CO.

DAYTON, OHIO.

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VOLUME XII *SATURDAY, NOVEMBER 4, 1905.* *NUMBER 19*

Novel Features of Communication on the S.S. Amerika

By Edward A. Tyler.

As a giant of the seas, the latest addition to the fleet of the Hamburg-American line is without a peer. The S.S. Amerika marks a new epoch in naval architecture, and in so doing becomes the pioneer in the adaptation of the most modern requisites of hotel life to the conditions of ocean travel. Amongst the many innovations for which this vessel is peculiar, are four electric elevators. Three of these are used to assist in handling the cargo and one is for passenger service. A large cabin is set apart for the use of the children on board and an elaborately fitted gymnasium is provided for the use of the first class passengers. If any wish to try the efficacy of electric baths a room fitted up with the necessary apparatus and in charge of a competent operator is at their disposal. Notwithstanding the fact that one's meals are included in the cost of the passage, a restaurant, separate and distinct from the dining saloon, forms probably the most unique feature of the steamer. Here meals are served à la carte at all hours, under the management of one of Europe's most famous restaurateurs.

Electricity plays an important part in the operation of the Amerika. Upwards of 400 kilowatts are generated for heating and lighting and running the hundred or more motors. All these numerous departments are brought in close touch with one another, and with the executive head by the use of telephones.

Steward Using Cabin Telephone. The two buttons are for signalling the switchboard and calling for a steward.

Of the systems which will hereafter be described there are four, each of which is designed to serve its own special purpose. Together they form the most complete means of communication that has ever been installed upon shipboard. The different systems and their uses are as follows: One for stateroom communication to the stewards and, through a main switchboard, for interconnection between passenger's cabins. Another separate system is for the exclusive use of the steward's department. The reason for this will be better understood when it is stated that there are upwards of 150 people in this department alone. For the navigating and engineering departments there is a naval equipment and the Blake system for the transmission of submarine signals completes the list.

The instruments for the stateroom and steward's departments are of the well known hand micro-telephone type. In the stateroom system there are at present nearly 100 telephones, but this number does not represent one station per room. Several of the cabins have no telephonic connection, in fact only those commanding the higher prices have so far been equipped. In several of the suites, which consist of three or four rooms, there are two instruments bridged on the same circuit so that a passenger has the choice of either of two locations, to suit his convenience, from which to make a call. In connection with this system there are three branch switching points in charge of attendants. The circuits terminate at magnetic signals and cut-off jacks. Signaling is done by means of push buttons which close the signal circuits through a battery of dry cells lifting the targets into view from behind a black shield. A call being received, the operator notes the number of the circuit and plugs into the associated jack.

If the calling party desires to talk to another passenger, the operator withdraws his listening plug and with an auxiliary cord circuit connects the line to the main exchange. This is situated at the bureau of information, and is illustrated on the third page. The cabinet is finished in white and gold to match the surroundings. A more appropriate and artistic arrangement could hardly be devised, and thus the central telephone station is one of the most interesting and important features of the vessel. In addition to the regular target indicator, this switchboard is equipped with a lamp signal system which acts as a check upon the lines terminating at the board and also at the branch switching points. The moment a telephone call comes to any switching point one of the lamps is lighted and remains so till the call is answered. Thus if the attendant at the branch board should not be at hand the information clerk is notified by the lighting of the pilot light and he at once dispatches a messenger to answer the call.

The steward's system is separate and distinct from the stateroom equipment. It connects at each of the branch exchanges and also with the kitchens, pantries and similar locations, and is used for the convenience of the heads of the kitchen departments and chief steward. This is a single line system, with five bridged stations. Vibrating bells and code ringing over one side of the line and a third wire are used for calling.

The naval type loud speaking instruments connect between the navigating stations, engine room and engineer's office. In

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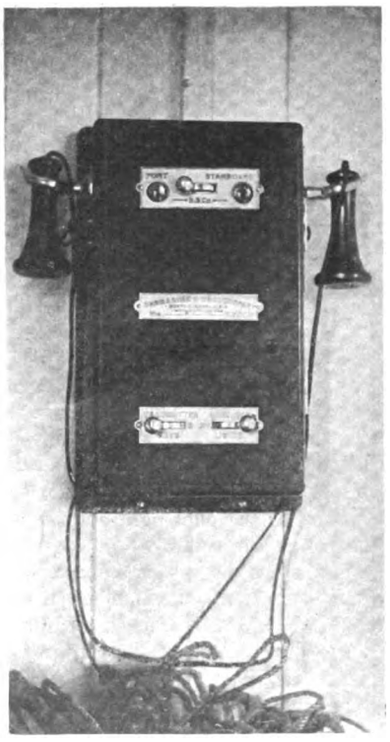
all there are twelve of these, distributed as follows: Five in the telephone house on the bridge, one in the crow's nest on the forward mast, one on the fore peak in the bow of the boat, one at the stern, two in the engine room, and two in the engineer's office. This installation differs from the others in that not more than two instruments are on a circuit; thus there are direct wires between the bridge and all the other stations and between the engine room and the engineer's office. For use in the exposed locations on deck the apparatus differs in the mechanical arrangement of the parts, but the transmitters and receivers are similar.

The transmitter and receiver are mounted in one case back to back. From the rear a metallic tube extends which conveys the sound. In the illustration showing the instruments in the wheel house, the funnel shaped opening to the left of the transmitter is the receiving horn. The transmitter is protected by a heavy grating which together with the casing is made of bronze. Signaling is done by means of a plunger type push button working in a watertight stuffing box. This button is mounted on the upper right hand part of the transmitter case. The switch for cutting in the talking circuit of the type of instrument shown in the telephone house illustration, consists of a wing shaped lever shown below the transmitter, the stem of which passes through a watertight bearing into the interior of the box. It moves horizontally and is provided with a retractile spring movement, which necessitates constant pressure upon it to keep the circuit closed.

In the deck type the switching operation is performed by rotating the receiving tubes to a horizontal position, through an arc of a quarter of a circle. This operation also moves the transmitter case which, when at normal position, rests with the transmitter opening in a horizontal position, face downward. This is to prevent the lodgment of water within the grating. The entire telephone is mounted upon a heavy iron standard which may be turned upon its base. With this arrangement the officer using the instrument can face in any direction that suits his convenience. The illustration shows the apparatus at the stern, which is mainly used for orders when the vessel is being docked.

The extended ear pieces for the deck instruments are necessary, on account of the excessive noise caused by a strong wind. Where the telephones are protected from this trouble it is not necessary to get close up to them when talking or listening, as they are especially designed for exceptionally loud transmission.

The receiving station of the submarine telephone signal system is located in the telephone house. The receiving transmitters are placed well forward near the bow inside the hold, one on each side of the vessel below the water line. This apparatus is used to locate the position of submarine signal bells installed at the entrance to harbors or on dangerous reefs. Owing to the fact that sound vibrations travel very rapidly and clearly through water and also because they are not readily reflected, the location of a signal can be accurately determined by connecting the receiving apparatus to first one and then to the other of the transmitters. When the transmitter on the side from which the sound is coming is connected up the signal will be heard very clear and strong, but if the receiver is switched on to the other transmitter the sound will be greatly diminished.



Receiving Instrument of the Blake Submarine Signal System.

Naval Type Telephone located at the stern for docking purposes.

This installation as a whole is representative of European rather than American practice in marine telephony.

It will be seen that some of the offices performed by the telephone system relate to matters which tend principally to increase the efficiency of th personal services afforded the passengers. In this class may be placed the system by which cabins can be connected to each other, or communication held with the information bureau. On a steamship so tremendous in size as is the Amerika, the total saving in time over that taken for the performance of errands by messenger can scarcely be estimated. In the single matter of furnishing replies to calls for information, the promptness and satisfaction resulting from the use of the telephone fully justify the expense of its installation. The convenience arising from its use for direct communication between the rooms of passengers widely separated, for the making of appointments and other social purposes is an additional source of satisfaction and comfort to travelers on a boat where this is possible. Its uses are becoming so fully appreciated that the complete development of this class of business on shipboard is as certain as it has come to be for modern hotels. Another important use of this class is accomplished by the system for communication between divisions of the steward's department. Here the telephone has immensely simplified the methods of transmitting instructions. The confusion and annoyance to that department resulting from much hurrying from place to place in limited quarters, has been done away with. The usual amount of work is performed not only more rapidly, but with a smaller staff of employes than would be possible with any other means of communication. This results not only in a saving in daily expenses, but is an improvement in the service, which must be very attractive to the patrons of the ship. These features, however, are not the most interesting nor important applications of the telephone to marine service. They are simply duplications in their main details of equipment and operation, of systems which may be found in common use and accomplishing similar purposes, in hundreds of hotels on the land. The most essential fact brought out by this installation is the admission of the superiority of the telephone for transmitting information and instructions which affect the control of the movements of the ship. Hitherto, as until recently has been the case with railroads, the reliability of the telephone and its ability to withstand the conditions of rough service in severe weather have been questioned. Its use has been regarded as a doubtful experiment, in which not too much confidence should be placed. Gradually, however, it has come to be recognized that the sources of dissatisfaction did not lie in defects inherent in the instrument. The faults rather have been

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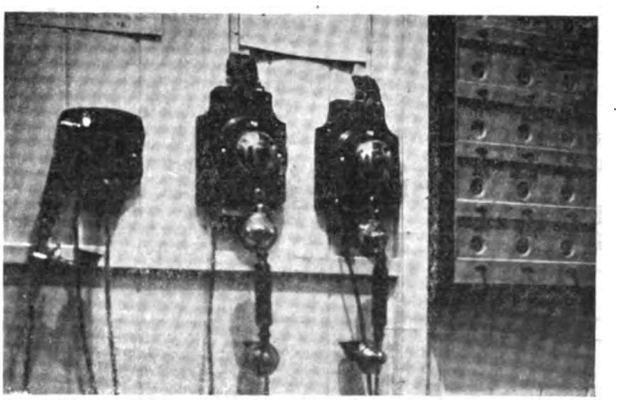
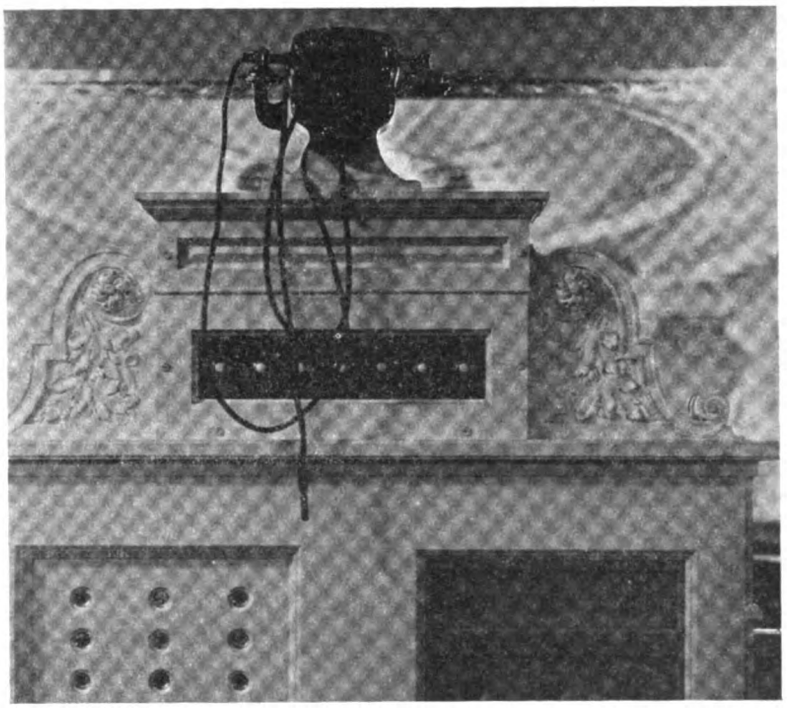
found in a failure to properly adapt the auxiliary instruments to the conditions to which they were exposed. The success of this particular installation, and of others which will follow it, will be due to a careful study of these conditions, and to the general design of apparatus to meet them on broad engineering principles. The problem to be solved was the adequate protection of the instrument from the weather. Any mere adaptation of the forms of construction which have been developed for interior service on shore has been to a large extent a failure owing to the absence of such security. The complete originality in design of the instrument illustrated at the top of the second page shows the advantages of attacking such a problem from a new and justifiable point of view. When it is borne in mind how small a proportion of the troubles which reduce the efficiency of telephone systems on shore are found in the transmitter and receiver, there can be little doubt of the success of a system on shipboard in which the general appliances and details of construction conform to correct standards of design and workmanship. In this connection it is interesting to note that the necessity for the greatest reliability, as well as for possible simultaneous service from several points, has brought about an installation from which switching devices are absent. All lines involved in the control of the ship consist of a pair of wires run directly between the two instruments concerned, so that all connections are of the simplest sort, and easily traced.

The desire to avoid every possible source of trouble which might lead to a breakdown at a critical moment led the installers to take all possible precautions in laying out and placing the wires. No wire smaller than No. 18 B. W. G. is used in the system. The conductors are insulated with gutta percha, and where this is possible, a lead covered cable of wires thus insulated is used. A further protection to the sheath is provided by a durable, weather proof, braided covering. Stuffing boxes are used in all cases where the cables pass through water proof bulkheads, in order to make the aperatures absolutely water tight and protect the adjacent compartment in case one should become filled. When terminal boxes are used the bases are made of smooth slate, and the whole structure is so tightly closed as to be wholly unaffected by moisture, even if submerged.

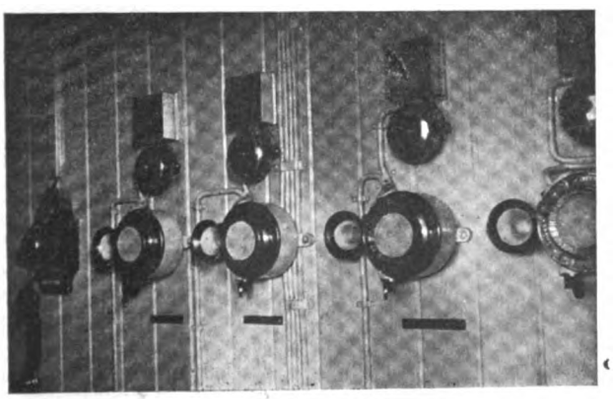


One of the Branch Exchanges for the Cabin System. The board shown to the right is the annunciator for the telephones.



Main Switchboard at Bureau of Information. Lamp signals are shown in the upper panel; jacks are on the left and the signals on the right.

The main switchboard for general service was made by Gent, of London; naval instruments by W. Lankenauer, of Bremen, and the submarine signal system by the Blake Submarine Signal Company, of Boston. The plant was installed by W. H. Allen, Son & Company, of Bedford, England. The telephone system, as well as the other electrical apparatus on the ship, is maintained under the direction of H. Jahn, who is assisted by four electricians.



***Naval Type** Telephone in House on the Bridge. Each instrument connects with a different station by an independent circuit.*

MAY BE FORFEITED TO THE CITY.

A PECULIAR as well as interesting condition exists at Kokomo, Ind., where the Citizens' Telephone Company may forfeit its property to the city. Despite the fact that the City Council refused to modify the company's franchise, so as to permit it to enter into a combination, or service contract, with the Bell company, it is understood that such arrangements are now being carried out by the Citizens' company, and that connections are being made over the Bell lines. Section two of the company's franchise provides for forfeiture of the company's property to the city in case it enters into combination, leases or sells to a competing company. The Citizens' company sought to have this prohibiting clause modified, but failing in this, is said to have ignored it, and now it remains to be seen what the city can do toward forfeiting the property in accordance with the provision of the franchise.

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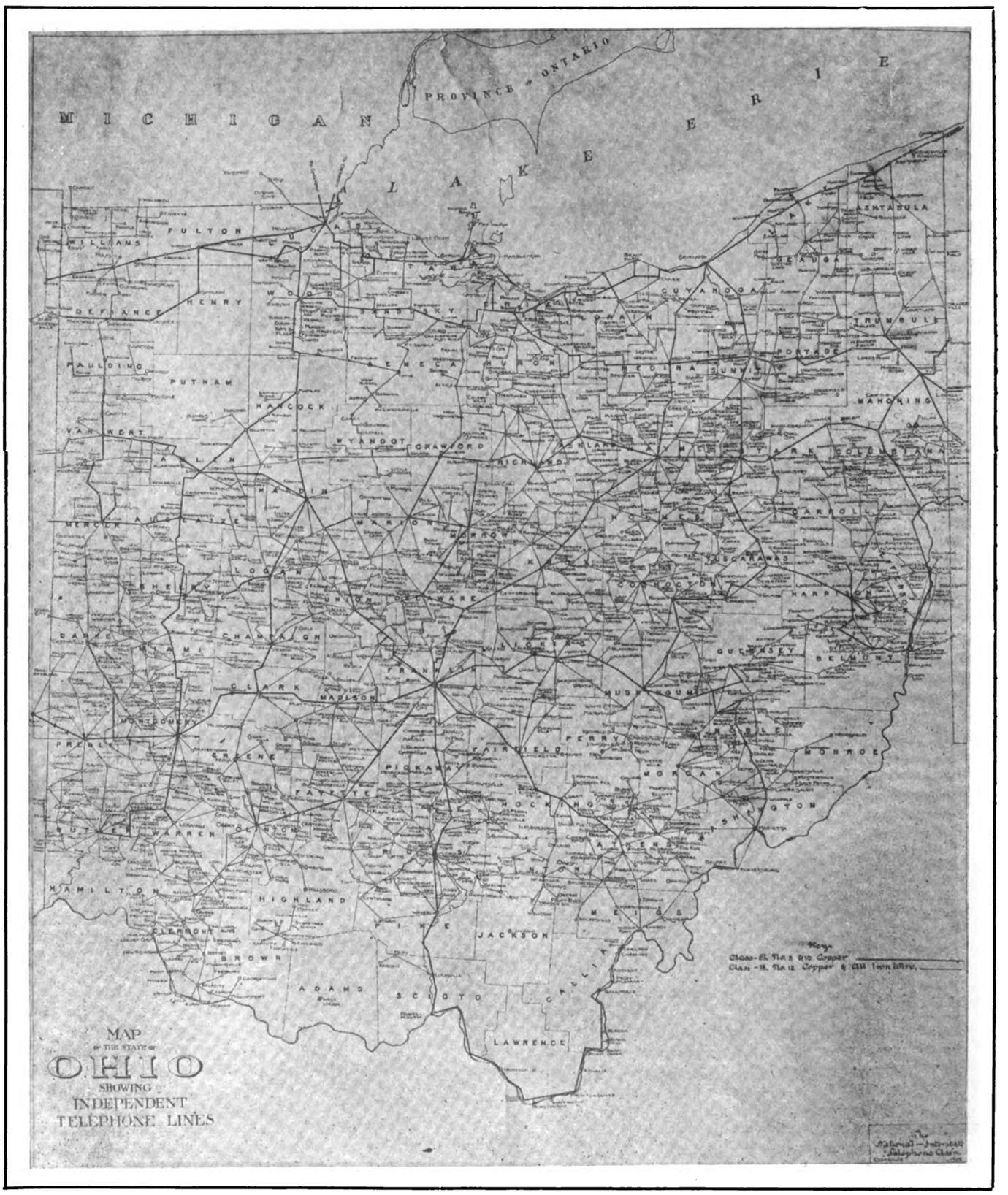
Ohio Independent Telephone Lines

THE accompanying map of Ohio is only a preliminary edition, showing about 75 per cent. of the toll lines actually in existence. Considerable data for lines not shown has been received since tracing was made up, and the remainder is being gathered as rapidly as possible. A later edition of this map, which will be issued in the near future for general distribution, will show all of these lines.

INDEPENDENT COMPANIES OPERATING TOLL LINES IN OHIO WHO HAVE NOT ALREADY SENT US A MAP OF THEIR LINES ARE URGED TO DO SO IMMEDIATELY, IN ORDER THAT THERE MAY BE NO UNNECESSARY DELAY IN GETTING OUT AN UP-TO-DATE EDITION.

THE NATIONAL-INTERSTATE TELEPHONE ASSOCIATION.



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More Bell Telephone Press Agent's Statements Refuted.

A REPORT purporting to show the insecure financial condition of various Independent companies in the State of Ohio has recently appeared in the Pittsburg (Pa.) "Commercial Gazette." Desiring to get at the facts in the case, James B. Hoge, president of the National-Interstate Association, communicated with the officials of the companies in question. Their replies are herewith set forth:

IOWA CITY, Iowa, Sept. 9, 1905.

Mr. J. A. Harney, Assistant Secretary, The National Telephone Association, Cleveland, Ohio:

MY DEAR MR. HARNEY: Replying to yours of the 5th, first I wish to thank you for calling our attention to the libelous statement in the Pittsburgh *Commercial Gazette*. I say libelous because it is not the truth, and the party givng the information to the *Gazette* knows it is a lie.

As you desire a statement for publication of our side of the question, I will go somewhat into detail. January 28, 1904, we had in operation in Iowa City 785 telephones paying a rate of $30 and $18 per year for business and residence service. At the same time our competitor, the Bell Company, had nine (9) paying telephones in operation. On the night of January 27, 1904, a most disastrous sleet storm visited our section taking before it everything in the way of telegraph, electric light and telephone wires. The morning of the 28th we had just 84 telephones working, so you can gather some idea of the completeness of the wreck wrought. We were at that time preparing to re-equip our entire exchange outside, substituting cable for open wire work. Our pole leads carried from seven to sixteen 12 pin crossarms, with *all* of the pins occupied. The exchange had grown so fast that we had up to this time not had time to re-equip the outside construction as it should be, and is now.

We announced to the public the completeness of our wreck, and notified them that we would devote the next 60 days to reconstruction of the plant, and that no charges would be made for city service until that time (60 days) had elapsed or till further notice. We immediately telegraphed for cable, and in the allotted time, 60 days, we had installed, in place of the open wire or crossarm construction, seven and one-half miles of aerial cable. (At this time we had five and one-half feet of frost in the ground, otherwise we would have put the downtown districts underground.) This cable distribution gave us a capacity of 1,150 metallic lines, and it was so distributed that not more than three blocks of open wire is necessary to connect any resident in the city to our cable, thence into the central.

Within one week after the sleet storm, the Bell Company put 42 men in the city and eight solicitors, and, figuratively speaking, went after the business "Hammer and Tongs." They ran rubber covered wire through trees, on the parking, over houses, and by putting eight to twelve on a line succeeded in getting about 400 telephones installed by the time we were ready to resume business. This was very expensive for them. All of the temporary work done in such haste had to be replaced with the right kind of construction. Their solicitors circulated many stories about how it would take us eight months to a year to get our plant in shape to give the public service; that we were busted and that they would give us 30 days to live; 30 days came and went, and they made it 90 days; that came and went, and they very generously extended the time to six months, after which we have heard nothing from them. To make the rest as short as possible, we have been steadily increasing our subscribers' list until now we have 829 bona fide subscribers in operation, have a waiting list of seven. The Bell Company has nearly 500 telephones in operation now, between 480 and 500. This is only made possible by the Bell giving absolutely free with every business telephone, paying an annual rental of $24, one residence telephone. For residence telephones installed by the Bell and not accompanied by a business telephone, there is a charge of $12 per annum. This practically puts their exchange on a $12 basis per annum each. We have never changed our rates to less than $30 and $18. I am able to state positively that the moment the Bell begins making charges for the free residence telephones, it will lose practically the whole subscription. People say that so long as the Bell is willing to give them a free telephone they will just stick them for it, BUT the moment they ask pay, OUT they will go. If there is any doubt about this latter statement, tell them to try it, that is the only way to get facts.

We are not bankrupt by any means. We have a bonded indebtedness of $30,000, which is not due for seventeen years yet. The plant is taking care of the growth nicely, and the stock is paying semi-annually 4 per cent. We are perfectly willing you should publish this letter, and make it reach as many homes as you like, the more, the better it will enlighten the unsuspecting.

Again thanking you for the opportunity of correcting this grievous wrong and malicious lie, I am,

Very truly yours,

A. T. PRESSON, Secretary.
Johnson County Telephone Company.

P. S.—Prior to our coming here the Bell Company had 100 business telephones and 47 residence telephones, for which they received $48 and $24 per annum each. Just think, 147 all told, and they had been in operation here for nine years.

A. T. P.

WATERLOO, IOWA, Sept. 8, 1905.

Mr. James B. Hoge, President, National-Interstate Telephone Association, Cleveland, Ohio:

DEAR MR. HOGE:—Answering further your inquiries of August 30th and September 5th, regarding the Iowa companies mentioned in the clipping from the Pittsburg paper, will say that I am quite familiar with the history of this company.

The U. S. Telephone & Telegraph Company, of Waterloo, which has been succeeded by the Corn Belt Telephone Company, is one of the largest Independent companies in the State, and occupies one of the most productive territories in the State, or in the west for that matter.

This company was originally organized under the name of the Cedar Valley Telephone Company, and was reorganized under the name of the County Telephone & Telegraph System with an increased capitalization. When this company had grown beyond all expectations it was absorbed by a new corporation under the name of the U. S. Telephone & Telegraph Company, but failed in its endeavor to take up all of the old Cedar Valley and County T. & T. stock, and finally for the purpose of determining the priority of the bonds over the preferred stock, the bondholders instituted an action in the U. S. Court. The result of this action gave to the bondholders title to the property.

Then the Corn Belt Telephone Company was organized and bought the property from the bondholders, and to show that the property was not in such a bad way, the Corn Belt Telephone Co. immediately borrowed $100,000.00 on the property, to be used in the development and betterment of the service. The alleged failure of the U. S. Telephone Company may have been due to some mismanagement or inexperience, but we would rather say that it was due to the extremely rapid growth of the business, as it certainly could not be on account of the "unproductive territory" through which the company had built, as is alleged by Mr. Connell. You may say that the property is now in the hands of "none but the most honest and experienced men," and that the Corn Belt Telephone Company is doing nine-tenths of the business in the ten counties in which it is operating.

S. S. LICHTY, Secretary,
The Corn Belt Telephone Company.

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QUERIES

USE OF TESTING SET—(620.)

Will you please publish the uses of a Leeds & Northrup Decade Test Set. I have one here and have several long lines, and would be able to use it a great deal. R. P.

THE Leeds & Northrup Decade Portable Testing Set, Fig. 620*a*, is arranged for measurement of conductor resistance and the location of faults, grounds and crosses by the Murray and Varley loop methods. Provision is also made so that

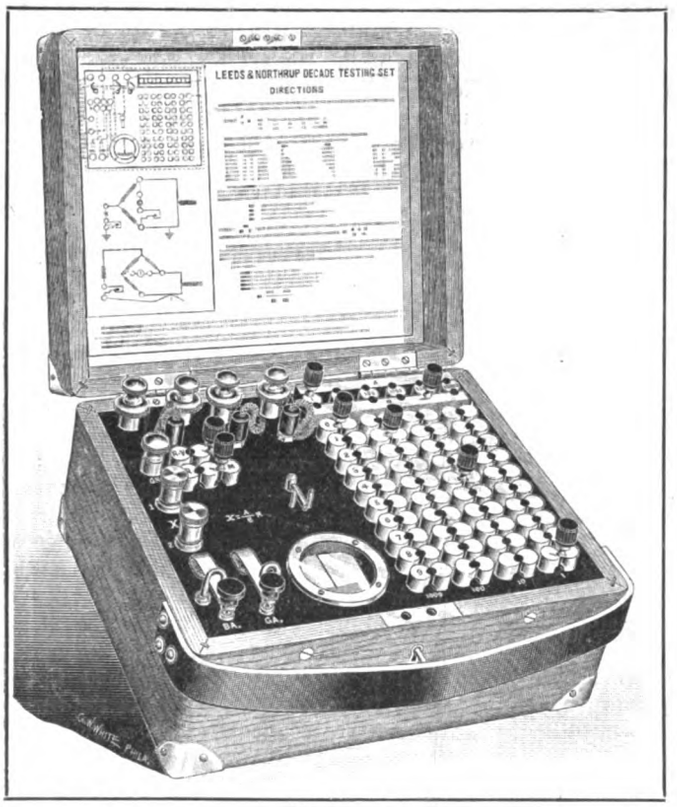

Fig. 620a.

all the resistances in the bridge arms and rheostat may be used as a resistance box, or the galvanometer can also be used in series with the rheostat and galvanometer key. Outside battery and galvanometer can be connected to the set in place of the contained battery and galvanometer, as may be required in locating faults having a very high resistance.

The coils in the bridge arms, like those in the rheostat, are arranged on the "plug in" plan. Reference to Fig. 620*b* will show that any coil may be used in either arm and that the coils can easily be reversed by placing the plug at A or B. The reversal of the bridge arms in the Leeds & Northrup Decade Set does not alter the formula $X = \frac{A}{B} R$. In sets arranged with a commutator in the bridge arms, it is necessary to memorize which plugs produce the ratio $\frac{A}{B}$ and $\frac{B}{A}$ which frequently leads to error.

RESISTANCE MEASUREMENTS. Plug in at blocks R and R-V. Uuplug M and M. Select ratio wanted and vary rheostat until a balance is obtained.

Then $X = \frac{A}{B} R$. A = Resistance plugged in ratio arm A.

B = Resistance plugged in ratio arm B.

R = Resistance plugged in rheostat.

MURRAY LOOP TEST.

Connections for the Murray loop test are made as indicated in Fig. 620*c*. The faulty and good wire are joined at the distant end of the cable. Connect the faulty conductor to the binding post X_2 and the good conductor to binding post X_1, and measure the total resistance of the loop. Call this r. Then connect post Gr. to ground and plug in M and M, unplugging R and R-V. Plug

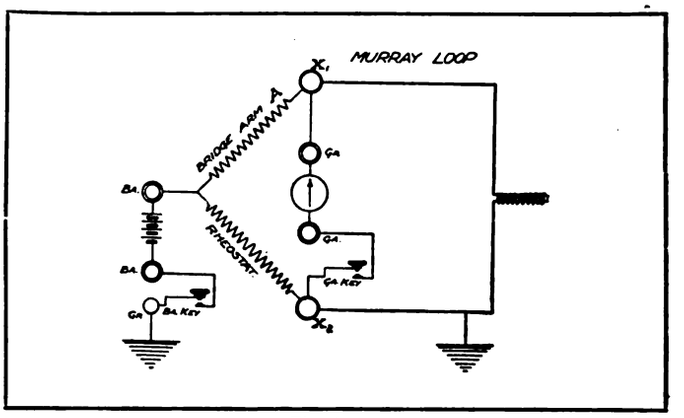

Fig. 620c.

one coil in bridge arm A (usually the 1,000 ohm coil) and vary rheostat until balance is obtained.

r = total resistance of loop.

a = resistance to fault.

A = resistance plugged in bridge arm A.

R = resistance plugged in rheostat.

Then $a = \frac{R\,r}{A+R}$ or, if L = length of one of the two cables which are assumed equal, since a and r are proportional to the lengths, the distance of the fault is $d = \frac{2\,L\,R}{A+R}$

VARLEY LOOP TEST.

Connections for the Varley loop test are made as indicated in Fig. 620*d*. The grounded wire and good wire are joined at the

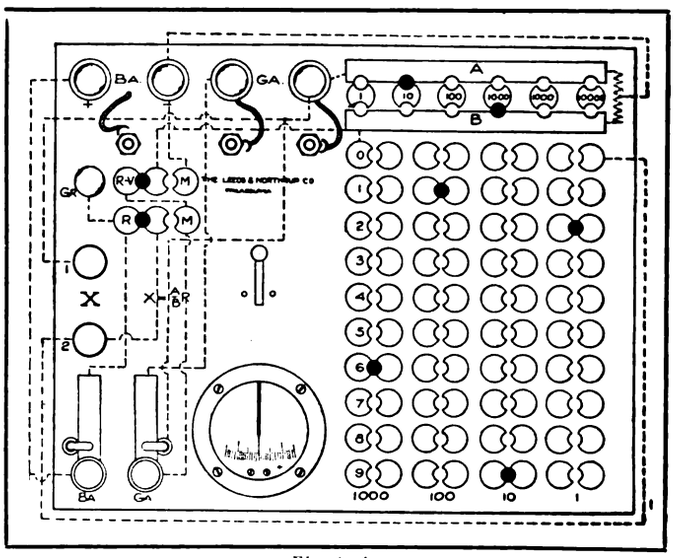

Fig. 620b.

distant end of the cable. Connect the grounded wire to X_2 and the good wire to X_1, and measure their total resistance. Call

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this r. Then plug in at R-V, leaving M, M and R unplugged. Connect post Gr. to ground, or if the fault is a cross, connect the wire crossed with the faulty wire.

Plug resistances in bridge arms A and B, and in rheostat, until a balance is obtained.

Then letting

r = total resistance of loop.
a = resistance to the fault (ground or cross).
A = resistance plugged in bridge arm A.
B = resistance plugged in bridge arm B.
R = resistance plugged in rheostat.

$$a = \frac{B\,r - A\,R}{A + B}.$$

To use a resistance box. Remove plugs from R-V, R, M and M. Both bridge arms and the rheostat are then in series with posts X_1 and X_2.

To use galvanometer in series with the rheostat and Ga. key, plug in R-V, plug out M, M, R and bridge arm A. Galvanometer, rheostat and Ga. key are now in series with posts X_1 and X_2.

To use outside battery. Connect battery in at Ba. posts, having disconnected Ba. flexibles from studs.

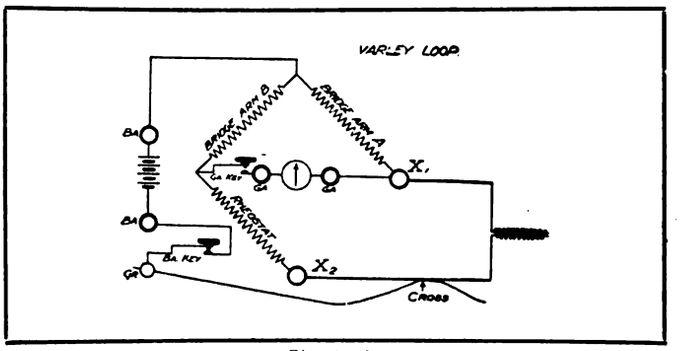

Fig. 62od.

To use outside galvanometer. Connect outside galvanometer in at Ga. posts, having disconnected Ga. flexibles from studs.

The Simplification of Circuits

By Frederick T. Johnson.

THERE is a simple way of tracing circuits, and of making them clear, even to those who have not had much experience. The method is based upon the fact that the principal telephone circuits in use at the present time are built up by the combination of sets of simple elements. The number of such

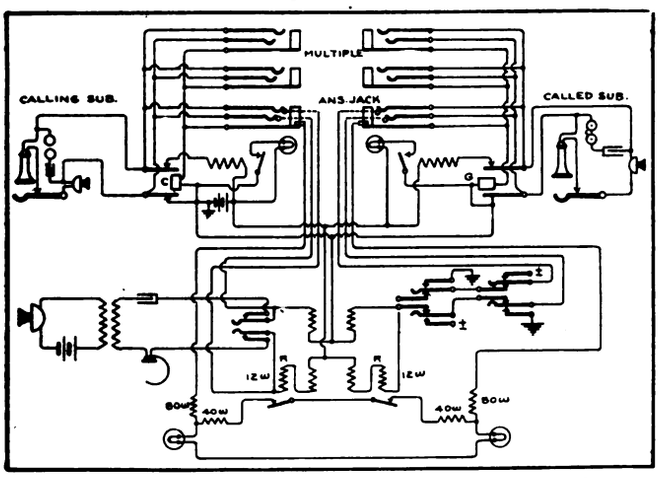

Fig. 1. Circuit for two connected lines in central energy exchange.

combinations is so great, and increasing so rapidly, as to make it practically impossible for an individual to memorize even those in common use. However, a man may so train his mind that on seeing a new and complicated circuit, he can almost instantly analyze it and discover the method of its operation. Each part will seem to stand out by itself—one part for transmission, another for ringing, another for signalling at a certain time, and so on. When the student has got to this point, for his complete understanding of the method of operation of the circuit it is only necessary that he should gather the relation of each part to the others.

An example of this method of reasoning may be given by taking up a circuit which, while not complicated, involves several of the principles in constant use in telephone exchanges. Fig. 1 shows a circuit by means of which one subscriber talks to another when their lines are connected together through a central energy switchboard.

This represents the result of a gradual growth from a simple circuit to one more complex. Beginning with two connected magneto telephones, the circuit as simplified without hook switch, magneto or bell, appears as shown in Fig. 2.

The connection of these lines through an exchange brings about the introduction of several new features. These provide a means for receiving a signal at the central office, for the ascertaining of the subscriber's wishes, and, finally, for completing the desired connection to the line of a second person. The first object is fulfilled by bridging a magneto drop across the line. The turning of the crank at the subscriber's instrument energizes this drop and causes its shutter to fall, attracting the attention of the

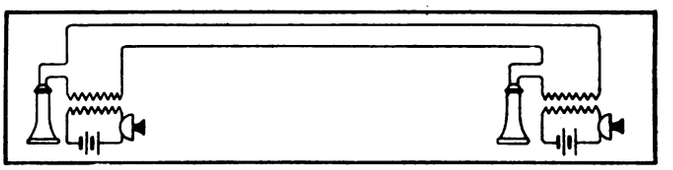

Fig. 2. Simplified circuit for two connected telephones without switching device.

operator. To answer calls the operator is supplied with a number of connecting cords. By means of these, through the medium of jacks and plugs, a flexible connection between two lines can be made. The introduction of the operator's telephone set makes it necessary to place a key in each cord circuit, by means of which a single telephone circuit may be connected at will between the two sides of any cord.

The operator's telephone set is of practically the same type

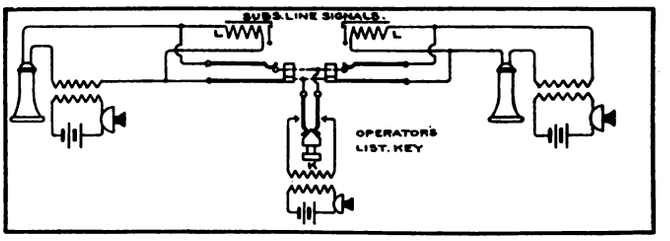

Fig. 3. Basis of circuits for connecting two stations through jacks and cords.

as the set used at subscribers' stations, and here we see the first application of the suggested method brought into play. It simply means a duplication of the essential features of the subscriber's instrument.

(To be continued.)

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THE EDITOR'S PAGE

FINANCIAL FEATURES OF LINE CONSTRUCTION.

THE construction of a telephone line of any great length calls for a careful consideration of certain features which relate not only to engineering principles, but to the financial conditions involved. Reduced to its lowest terms, a line may be considered as a group of wires, stretched between two given points, and supported on insulators attached to poles. The choice of routes, the selection of poles, the digging of holes to receive them, their equipment with cross arms and insulators and erection, and the stringing of wires are the operations which are apparent at first sight as necessary in connection with this department of telephone work. But further consideration will show that line construction depends for its intelligent development upon certain fundamental principles, which may be regarded as pertaining strictly to the amount of money to be expended, and determine the items of actual practice. What, then, are these conditions which govern the cost, and therefore the character, of the construction to be adopted?

In order to present these facts substantially, it will be necessary to refer to certain scientific principles in the case. These include the line resistance and its relation to the insulator resistance, the character of the route and possible changes therein, and possible increases in population.

It is always an act of discretion on the part of the designer of the line to select a wire of higher or lower resistance. It is equally within his power to choose insulators whose insulation resistance exceeds the ordinary figures of those commonly adopted. But it is evident that in long distance lines, the choice which is guided to select the superior conductor and insulator, is a correspondingly expensive one. What, then, are to be regarded as the determining factors? Is the limitation of cost, the governing influence; or the advantages to be derived from a better class of conductors and insulators? In the latter case the choice of a copper instead of an iron wire is the choice of a good conductor. It means a conductor which for equal length and cross section is six times better than the iron. It means that even with defective insulators the quantity of current reaching the other end is far greater than can be obtained in the iron.

On the other hand, an iron wire with good insulators might deliver almost as much current as a copper wire with bad. Little doubt should remain, however, of the current wasting power of an iron wire line, supported on ordinary insulators. If facts are needed to bear out this last conclusion, it is only necessary to examine into the delicacy of a telegraphic relay, connected to a long line, and observe the minimum of current which operates it, in comparison with that sent in at the other end. But this does not as yet dispose of the relationship between the metal used for wire and the insulation resistance of the line. In this respect the insulation resistance presents a few interesting and peculiar features. A copper line with poor insulators will deliver more current than an iron wire with equally poor insulators. The reason for this is obvious, as a matter of the ratio of resistances and therefore of currents.

In telephone line construction, while cost is, and must be, among the first of all considerations, it is evident that a line erected for the purpose of transmitting currents of the extreme delicacy of those developed in telephony, cannot be classed with those used for telegraphic purposes.

The unfortunate thing in telephony has been this once widespread belief that ordinary conditions of transmission would do; or the belief that any form of metallic connection between the sending and the receiving end would establish such contact, that sound would, of necessity, be reproduced. Fortunately the problem of line construction has in these latter years given rise to new conceptions of the requirements of efficient construction. It cannot be said that a high tension power transmission plant requires a better insulation for its lines in proportion to its potential and current than a telephone line of any considerable length. In fact, there is a very strong possibility that investigation might show an actual need, relatively, for a better insulation. From the standpoint, therefore, of line efficiency the superiority of the well insulated copper conductor stands apart as an isolated proposition.

Taking up the matter of possible changes in the route, it becomes at once obvious that its selection is of the highest importance. There are many factors which enter into its determination, and among these one of the most important considerations is the question of the permanence of the line in a given location. A long distance line should be constructed in such a manner as to carry, without undue strain on the supports, the greatest number of wires than are ever likely to be strung during its life. As this period may be dependent either upon the resistance of the equipment to natural causes of destruction, or limited by the necessities of reconstruction for arbitrary reasons, it is necessary to determine which of these causes will prevail. If the latter, extravagance would be shown in the erection of material possessing the qualifications which would fit it for the highest development in a long period.

The question of probable increases in the population, and consequently in the number of telephone subscribers and telephone conversations, in the districts served by a given portion of a system, calls for the most careful investigation by the engineer. It is in this single determining factor that the most frequent mistakes have been made in the past, and the mistakes have been among the most costly errors of all those which have lowered the value of telephone securities. If this growth be underestimated, a rapid increase in facilities soon loads the line to the limit of safety. The natural tendency is to delay reconstruction and overload the existing line. When this point has been reached a sudden extraordinary event, such as the occurrence of a severe sleet storm, has its maximum effect, and produces heavy financial losses to the telephone company. In addition to the losses due to the necessities of replacing the injured plant, annoyances are imposed upon the public which create a feeling that is likely to afford important advantages to a rival concern which, by reason of a properly constructed plant, is unaffected by the causes of disaster and able to furnish a satisfactory and continuous service. On the other hand, placing the probable rate of growth at too high a figure involves the construction of a plant which is expensive to erect, and represents a high first cost for material. The annual charges then become heavy to an extent which is wholly out of proportion to the income. Such an excess, although difficult to estimate, is a real, and possibly a considerable, loss to the company. It is a waste which always continues for a considerable time before its existence is established. On the fact becoming known, its correction offers a difficult problem to the most skilful management.

It appears from the above discussion that the determining features of line construction would necessarily be those which looks to a legitimate expenditure for reliable service, and not a flat footed limitation of cost, irrespective of the implied necessities. The investment in a good line provides the company with an asset of unquestionable value. In any territory where development is possible, and we believe that statement covers the entire country, it is the result of these well-considered expenditures which counts, and will in the future count to the utmost, in the development of a perfect system of communication and a strong and healthy business.

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THE TELEPHONE IN THE COURTS

CONDUCTED BY A. H. MCMILLAN.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

RIGHT TO ACCEPT AND REJECT FRANCHISES.

Has a City Council of a first-class city of Missouri with a population of 2,500 the right to accept and reject a franchise if they so desire?

SUBSCRIBER.

ASSUMING that the franchise has not beeen granted, but has merely been presented to the council by the company, the council has the right to accept it or reject it as it sees fit.

If your question went a little more into detail I could, perhaps, give a more satisfactory answer.

TELEPHONE AND ELECTRIC LIGHT WIRES ON SAME POLE.

Will you please advise me what is the Ohio State law regarding the placing of telephone and electric light wires on the same pole?

First.—Are they allowed to be on the same pole?

Second.—If so, what distance does the law require that there should be between the electric light and telephone wires?

Third.—Which wires does the law require to be on top? A. N.

TAKING up your questions as they are numbered, I would answer first, that there is no provision in the statutes of Ohio against having telephone and electric wires on the same pole. Secondly, there is no specific distance required to be left between electric light and telephone wires when strung upon the same pole. It is necessary, however, that such a distance be left, that there will be no danger of the heavier current of the electric light wires interfering with the lighter current of the telephone wires. Third, the telephone wire should be on top. The latter conclusion is based upon the fact that this is the less dangerous arrangement and not on any provision of statute law.

It does not seem to the editor safe to have both electric light and telephone wires upon the same pole. If they were so arranged, and any injury was caused thereby, I believe the companies would be held liable to any third person injured, or that either company would be liable to the other for damages sustained.

INJURY AT INSTRUMENT FROM LIGHTNING.

I have a number of THE AMERICAN TELEPHONE JOURNAL in which I see that you write the legal articles therein, and I write you for some references, if you have them at hand, applicable to an injury that was received at one of the Bell telephones in this vicinity a few days ago. The circumstances of the case are these: The party went to the telephone just before a thunder storm and while using it lightning came in on the wire and killed him. There was no lightning arrester and no ground wire at the instrument. Any case or cases that you have at hand or any information that you may give me in relation to the matter that would be applicable thereto would be very thankfully received. P. H.

THE case of Phoenix Light and Fuel Co. vs. Bennett, 63 L. R. A. 219, contains a brief in which a number of cases are cited to the point that the liability of a telephone company is the same when electricity from the atmosphere enters a building as it is when electricity from wires enter, provided, of course, that their presence is produced by the negligence of the telephone company. It is my opinion that there is no necessity for a lightning arrester or ground wire at the telephone, because I believe that the duty does not rest upon a telephone company to take precautions against such an extraordinary accident as a stroke of lightning. In the case above cited, the court held the essential error in the case to be the submission to the jury of any question as to the defendant's liability for the failure to insulate its wires entering the plaintiff's house against lightning. The law justly ascribes such consequences to inevitable misfortune or to the "act of God" and leaves the harm resulting from them to be borne by him upon whom it falls. Defendant's duty did not extend so far as to require the insulation of these wires in a manner to protect against injurious consequences of a lightning stroke, where the evidence showed that it was not practicable to insulate them against lightning.

KEYSTONE CONDUITS CANNOT BE SOLD.

OWNERSHIP of the Keystone Telephone conduits, which have been the subject of so much controversy, is likely to be so permanently vested in the Keystone Telephone Company that no other corporation can possibly control them. A special meeting of the stockholders of the Keystone Telephone Company will be held for the purpose of changing the articles of incorporation so as to prevent the directors of the company from selling real or personal property of the company without a vote of the stockholders. This step is due to the policy of the new blood which has been injected into the Keystone board. Control of the conduits came so near to passing to the Philadelphia Electric Company that the present board has determined to take out of the hands of the directors authority to dispose of the company's assets without the approval of the shareholders. This will probably fix for all time the ownership of the conduits, but it will not prevent the directors from renting some portion of the ducts to a desirable tenant, and at a price which will be remunerative to the Keystone Telephone Company. The step will also tend to prevent any rival telephone company from wresting away the conduits from their present owners. As this policy was known to the insiders it probably accounts for the recent strength of the Keystone shares.

EASEMENT ACQUIRED IN RAILROAD RIGHT-OF-WAY.

THE Supreme Court of Georgia has laid down the following principles relating to the acquirement of an easement by condemnation proceedings on the part of a telephone or a telegraph company over a railroad right-of-way:

A telegraph company acquires only an easement in the right-of-way of a railroad company, condemned for the purpose of constructing and operating a telegraph line thereon, the land actually occupied by the poles and fixtures for guy wires, and the right to stretch the wires upon the poles, and to enter upon the right-of-way to construct and repair the telegraph line. The only exclusive right of occupancy a telegraph company acquires, is the occupancy of the land occupied by the poles for telegraph purposes. The measure of damages in such cases is the value of the land actually taken, and the extent to which the use of the right-of-way by the railroad company is diminished by its use by the telegraph company. Peculiar advantages and benefits accruing to the telegraph company cannot be considered for the assessment of damages. The railroad company cannot recover the cost of the change of grade or the clearing of the right-of-way and keeping it free from obstructions. The possibility of poles placed at a greater distance than their height over the track, falling upon the track is too remote to be considered in estimating damages. Atlantic Coastline R. Co. v. Postal Telegraph Cable Co., 48 S.

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IN THE OPERATING FIELD

MEETING OF THE THIRD OHIO DISTRICT AT ZANESVILLE.

A MEETING of the Independent telephone delegates from the companies in the third district of the Ohio Independent Telephone Association, numbering 50 or 60 in all, held their regular semi-annual meeting at Zanesville on October 20. The sessions throughout the day were wholly informal.

From the reports made at the meeting there are at the present time 19,123 telephone subscribers in the district, these being accommodated by 90 exchanges. There are also 178 toll stations.

This district, of which J. B. Rhodes, general manager of the Zanesville Telegraph & Telephone Company, is vice president, is composed of Coshocton, Guernsey, Belmont, Monroe, Noble, Washington, Perry, Morgan, Meigs, Athens, Muskingum and Licking counties. Representatives from companies operating in these counties were present.

A number of the visitors addressed the informal meeting, the first held in the local district since last March. Among these speakers were Messrs. C. Y. McVey, M. B. Overly and F. L. Cary, of Cleveland; Frank L. Beam, president of the State association of Mount Vernon; A. B. Doudna, of Bridgeport; Dr. F. C. Huth, of Woodsfield; C. L. Jones, of Athens; S. C. Kissner, of Coshocton; William Hoyle, of Cambridge; W. H. Bowron and Judge Wheeler, of Caldwell, and C. H. Dew, of Summerfield.

Sherman M. Granger, vice-president of the Zanesville Telegraph & Telephone Company, and a number of other Independent telephone men of the district, made short addresses.

It was the general impression of all attending the meeting that rapid advancement was in sight in Independent circles. A rise in Independent telephone securities has occurred of late, and with the interesting of large corporations to some extent in all local companies it is hoped a uniform system of operation may soon be secured.

PROJECT FOR DEVELOPMENT OF INDEPENDENT PLANT AT DETROIT.

IT is reported that money has been subscribed for the purpose of putting in operation an extensive Independent telephone plant in Detroit. The movement is said to be under the control of capitalists from St. Louis, who are planning to start actual construction work in the near future. The plant and franchises of the Co-operative Telephone Company are likely to be acquired as a part of the new system.

BELL METHODS OF MEETING COMPETITION IN TENNESSEE.

THE town of Pulaski, 60 miles from Nashville, is in the throes of a very heated discussion on the question of granting a franchise to the Birmingham Long Distance Telephone Company. The Cumberland Company (a Bell licensee) has long had a monopoly in Pulaski and, it is alleged, has charged "all the traffic will bear." On October 26 the Mayor and Board of Aldermen of Pulaski passed an ordinance on second reading, granting to the Cumberland Telephone Company the exclusive franchise for five years, and turned down the request of the Birmingham Company. But public clamor was so great that the Board, on the following day, reconsidered its action and postponed the whole matter until its next meeting, asking the Birmingham people to submit their proposition at that meeting. The Cumberland people now come back with an offer to reimburse the town for a judgment paid for injuries received by one R. A. Burgess in connection with the telephone wires. This judgment against the town amounted to $350, and judgment was also rendered against the Cumberland company in the same suit, for $1,650. Now the Cumberland people offer to pay the judgment against the town and all other costs connected with the suit if they are given the exclusive franchise, and also to pay the town $300 a year in addition.

RECONSTRUCTION OF THE SYRACUSE PLANT STEADILY PROGRESSING.

THE reconstruction of the plant of the Syracuse, N. Y., Telephone Company's plant is being rapidly completed. On the underground work 160 men are at present employed laying new ducts and drawing in cable. A large force is at work erecting new aerial cable leads and reconstructing the present lines. During the past few months the country districts surrounding the city have been well developed and new toll lines have been and are being built to connect the Syracuse system with Rochester on the north and Albany on the south.

Since taking over the Utica system the Independent Securities Company has acquired a number of other properties, so that it now has an unbroken line from Little Falls, in Herkimer County, to Syracuse. The Rome system gave a line from Little Falls to Oneida, from which place there is connection with the Syracuse system.

It is expected that the new plant will be in operation by the first of the year.

MEETING OF THIRD DISTRICT OF MISSOURI ASSOCIATION.

A MEETING of the third district of the Missouri Independent Telephone Association was held at Moberly, Mo., on Friday, Sept. 22, at the Merchants' Hotel.

The State has been districted and the third district comprises the counties of Schuyler, Adair, Macon, Randolph, Howard, Cooper, Morgan, Moniteau, Cole, Boone, Callaway, Audrian and Monroe.

A number of Independent telephone managers in this district and some of those in adjoining districts were present, and compared notes and formulated plans for the handling of the telephone business in a more systematic and satisfactory manner.

INDEPENDENT COMPANIES OF INDIANAPOLIS UNDER NEW CONTROL.

AMONG the important exchanges in telephone properties which have been consummated recently were those of last week whereby the property of the Indianapolis Telephone Company and that of the New Long Distance Telephone Company, also of Indianapolis, fell into the hands of Toledo and St. Louis capitalists, the Toledo parties being James S. Brailey, Jr., who superintended the deal; the H. R. Ashbrook Company, Moses G. Bloch, Secor & Bell, Willard F. Robison and Clarence Brown, the St. Louis parties to the deal being A. H. Bauer and H. C. Stifel.

The property of the Indianapolis Telephone Company is an independent plant with about 13,000 telephones in operation in the city and county. Its capital stock was $1,700,000, on which was an outstanding bond issue of $800,000 5 per cent. securities, $100,000 6 per cent. preferred stock, $400,000 guaranteed 6 per cent. stock and $400,000 common stock.

The New Long Distance Telephone property comprises 3,600 miles of metallic circuits, and is the largest Independent long

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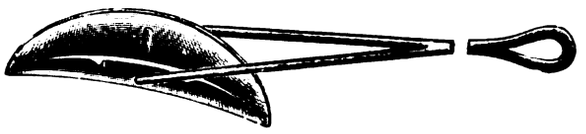

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distance line in the State. The capital stock issue was $753,000 and a bond issue of $171,000, 5 per cent. securities.

The Toledo parties purchased 3,000 shares of the Indianapolis Telephone Company and 4,000 shares of the New Long Distance Company, requiring $700,000. The gross earnings of the Indianapolis plant are $300,000, while those of the New property are $175,000.

TO RECLAIM TERRITORY TEMPORARILY LOST TO THE INDEPENDENTS.

A NEW telephone company has been formed at Marion, Ind., to reclaim a portion of the territory lost to the Independents by the sale of the United Telephone Company to the Bell interests. The new company is composed of men interested in the Delaware & Madison County Telephone Company, the Winchester, the Fort Wayne and other Independent companies. The company is backed by large capital and will install in Marion one of the best plants that money and skill can provide. Toll lines will be built to all surrounding cities and towns, and Marion will again be placed in telephone communication with the outside world over Independent systems. A franchise is now before the City Council and the merchants and people generally advocate its passage. The company agrees to place all wires under ground in the business part of the city. This movement will probably bring on another telephone war, and means that the monopoly created by the consolidation of the United Telephone Company with the Bell Company will be destroyed to the advantage of the business men and citizens of Marion, who have urged the formation of the new company. Already engineers have made a survey of the plant, and the cost will be about $300,000. It is believed the franchise will be granted at the next meeting of the council.

CONNECTION OF INDEPENDENT LINES TO THOSE OF SUB-LICENSEE COMPANIES DISCONTINUED.

AT a meeting of Independent telephone men of the eighth district of the Indiana Independent Telephone Association at Rushville, October 20, a resolution was passed pledging all Independent telephone companies of the district to refrain from any further service connection with any company that has a connection, direct or indirect, with any sub-licensee of the Bell Company. The Independents have nearly everything their own way in the eighth district. There are over 21,000 Independent telephones in the five counties against 1,100 of the Bell Company.

There is not now a single Central Union exchange in Rush County—even the toll station having been closed last week. The meeting was attended by representatives of 35 companies and the reports show remarkable progress and prosperity in the district. "Operating Conditions" was the principal question discussed. A. C. Lindermuth, of Richmond, presided, and C. O. Phelps acted as secretary.

ZANESVILLE TELEPHONE AND TELEGRAPH COMPANY TO SPEND $50,000 FOR IMPROVEMENTS.

AT a special meeting of the stockholders of the Zanesville Telephone & Telegraph Company $50,000 was voted for extensive improvements in the company's property in the city during the next year. Arrangements are being made and it is expected that these improvements will be completed by next spring.

The underground cable plant is to be greatly extended and new aerial lines will be installed for the outlying suburban and rural districts.

These improvements are contemplated to accommodate from 1,000 to 1,500 new subscribers.

Following the meeting of stockholders the directors of the company held a meeting. A dividend of 1½ per cent. was ordered paid on October 25, for the quarter ending October 1, 1905, also a dividend for the same amount, payable on January 25, 1906.

TO COMPEL GRANTING OF FRANCHISE.

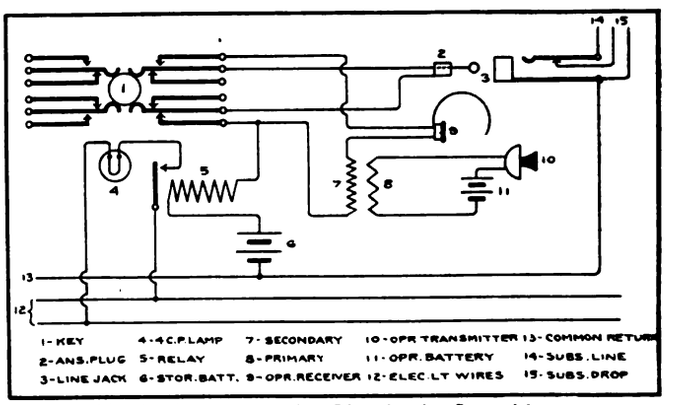
TELEPHONE men at Columbus, O., are much interested in the suit of the Independent telephone companies against the Cincinnati authorities in the fight to enter the Queen City with an Independent line. This case has been fought inch by inch in the local and district courts of Cincinnati and Hamilton county for over two years, and this week comes up for final adjustment in the Supreme Court of Ohio. The action is primarily against the city council of Cincinnati to compel that body to grant entrance into the city under a franchise ordinance offered by the Cincinnati Telephone Company, the Interstate Telephone Company, the Queen City Telephone Company and the Fitzsimmons Telephone Company allowing the erection of poles, stringing of wires, construction of conduits and the use of the streets for the conduct of general telephone business.

SUPERVISING CIRCUIT FOR COMMON RETURN SYSTEM.

By D. E. Bostick.

MANAGERS of telephone exchanges, in spite of the vigilance of their chief operators and monitors, receive frequent complaints from subscribers that operators are listening to conversations. The device hereafter described is designed to give chief operators a means of readily detecting such an infraction of the rules. It was installed to supplement a system in which lamps at the chief operator's desk indicated when an operator was listening on a connection, and has proved more satisfactory than that plan in operation.

The exchange in which this circuit was installed is of the common return type, with one side of the storage batteries con-



Circuit Arrangement for Listening-in Supervision.

nected to the common return. For this special equipment the operators listening contact of the sleeve side of the key was connected through a relay to battery. Above each operator's position was mounted a 4 C. P. pilot lamp, connected to the lighting mains, and local contacts of the relay. When an operator listens in on a connection, current from the battery actuates the relay, and the lamp is lighted. If the operator listens on the circuit a greater length of time than is necessary the fact is made evident by the continuous illumination of the lamp. In case the local lighting current is alternating, lamps should be of a different type, lighted by battery current, as otherwise noise would be communicated to the lines. This plan has been in operation for some time, and has proved to be an effective means of preventing complaints of the class mentioned.

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How to Make Your Directory Pay Dividends

If you could each month make your subscribers a present of a large illustrated magazine equal to "Everybody's" or "Munsey's," wouldn't they appreciate it?

Then if you had at your disposal free (and not at $500 a page, "Everybody's" price) the use of eight, twelve or sixteen pages in which to talk straight, in a personal way, to your subscribers; illustrating the talks with half-tone pictures of the office, exchange, operators, lines, scenes along the route of poles, etc., don't you know it would be a splendid advertisement?

Further: Suppose you had the advertising section at your disposal and could get contracts from your local merchants aggregating $250 to $300 per month, and

That such a publication, containing over one hundred pages, illustrated with photo-engravings, could be obtained—the full edition—for a net expense of from $75 to $100 per month,

WHAT WOULD YOU DO, MR. MANAGER?

We furnish for almost the cost of the paper a ninety page illustrated syndicate section, with beautiful cover in two colors. The publisher adds sixteen pages of local literary matter and his telephone directory and local advertising run alternately, all advertising in that way being opposite directory names, prints the "ads" on the two inside and back pages of cover, binds the magazine and, BEHOLD—he has a New York periodical in a country town—or inland city. Won't YOU try it? At least send for full information and sample magazines.

BROOKS PUBLISHING CO., LACLEDE BLDG., ST. LOUIS, MO.

THE ELECTRICAL TRADES EXPOSITION COMPANY

ANNOUNCES THE FIRST ANNUAL

ELECTRICAL SHOW

COLISEUM, CHICAGO

JANUARY 15 to 27, 1906

Make reservation for space to Thos. R. Mercein, General Manager, Monadnock Block, Chicago

OFFICERS:

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THE D. & T. ANCHOR

DRIVE — AND — **TWIST**

45 Seconds — 15 Seconds

NO INSTALLING EXPENSE — NO SLACK LEADS

The ONLY Anchor that can be installed in rocky soil.
The ONLY Anchor that does not give when the strain is put on,
The ONLY Anchor that PULLS on SOLID EARTH.
In Fact the ONLY ANCHOR.

Write for circular and our souvenir model.

THE D. & T. ANCHOR CO., La Crosse, Wis.

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TELEPHONE PATENTS

TELEPHONE APPARATUS.

Charles E. Egan, of Chicago, Ill., patents (No. 801,779; dated October 10, 1905; filed September 29, 1904; serial No. 226,504; assignor to the Egan Electric & Telephone Manufacturing Company, of Petrsburg, Ill.) a telephone system and apparatus.

This invention is applied in central energy systems, and has for its object the reduction of parts in the subscriber's set, as defined by the use of a combined ringer and condenser in combi-

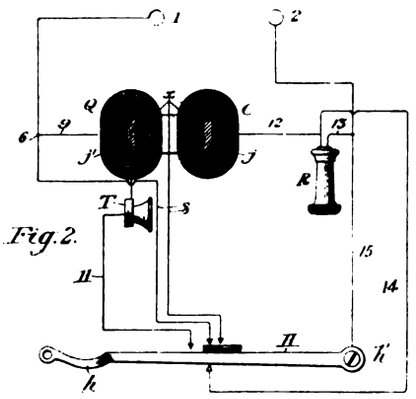

Fig. 2.

nation with other parts. A further object is to remove the necessity for an impedance coil separate from the other parts in the transmitter circuit.

In Fig. 2 are shown the cores j j^1 of the ringer, on one core of which, j^1, is placed a winding Q of insulated wire, approximating 1,000 ohms in resistance. Upon the twin core j is placed a wrapping of thin tin foil, wrapped in conjunction with paraffined paper to form a condenser marked C. In Fig. 2 terminals 1 and 2 are shown; also Q and C in series. They are bridged across the line in series with the receiver when the hook is up. A parallel bridge then exists through the transmitter. With the hook down, the receiver is shunted by a path of no resistance, and the transmitter path is open. The utilization of the coil and condenser is such that alternating current can only pass with the hook down through 1, 9, Q, C and wires 12, 14 and 15 to 2. Thus the ringer is actuated. In total for talking currents the path 8, C, 12, R and 13 is closed. For battery current, the transmitter path 8, 9, q^2, q^3, 10, T and 11 is closed. The claims cover these features as described with special reference to the development of ringing and talking circuits.

MAIN DISTRIBUTOR FOR EXCHANGES.

Georg Deisenhofer, of Munich, Germany, patents (No. 801,186; dated October 3, 1905; filed May 31, 1905; serial No. 263,035; assignor to Deutsche Telephonwerke R. Stock & Co., G. M. B. H., of Berlin, Germany) a main distributor for telephone exchanges.

In this invention the arrangement of the terminal members is such that the length of the frame for a given number of contacts, is one-half of that hitherto necessary, still permitting the various wires to be accessible. In a main distributor, according to this invention, the two terminal members of a pair are arranged close to each other, and so placed that their broad faces are turned to one another. The clamping screws thus extend in three instead of one direction thereby saving space. The interstices between pairs by this means are made less with consequent advantages as expressed in the patent.

SELECTIVE SIGNALING.

Frank R. McBerty, of Evanston, Ill., patents (No. 795,532; dated July 25, 1905; filed April 4, 1901; serial No. 54,230; assignor to Western Electric Co. of Chicago, Ill.) selective signaling apparatus.

The selective switching of circuits or control of mechanism from a distant point limits the ground covered by this invention. Its object is to provide means by which certain devices may be individually controlled without complication and with precision.

The feature in general is the use of pairs of electromagnetic switches, each group only responsible to a certain actuating current. Action from a distant point is obtained by the use of a series of currents which successively operate consecutive switch groups until any particular one is reached. This is possible, through the fact, that the actuation of one switch is the means by which the succeeding switch is brought into operation, such that it is ready to receive and respond to the next current.

In Fig. 1, 2 and 3, the principles enunciated are shown, crystallized. The sketches 2 and 3 showing detailed views of the controlling switch at the substation. The electromagnetic switches in pairs are shown at *l*, Fig. 1. By means of the line conductors 1 and 2 of the line, in conjunction with an earth return 3, the two necessary actuating circuits are obtained. Each electromagnetic switch controls the operative connection of a responsive device or branch, with a circuit fed from the actuating battery *f*. Each switch is adapted when actuated to cut off the responsive device

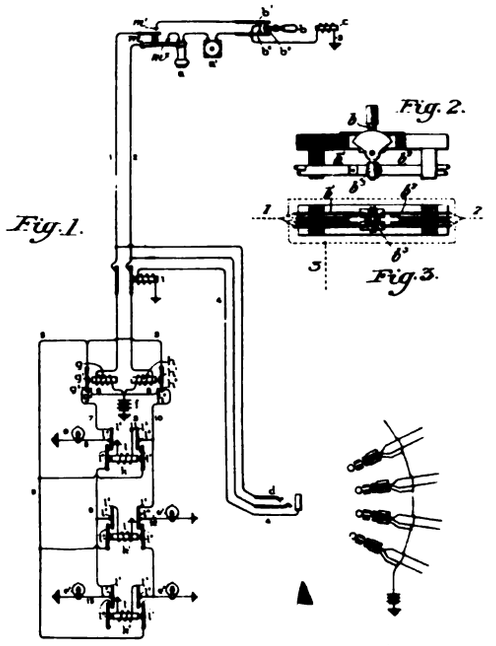

Fig. 1. Fig. 2. Fig. 3.

associated therewith and bring the magnet of a succeeding switch and another responsive device into operative connection with the circuit, so that it shall be actuated when the other current is supplied. By a proper manipulation of the switch *b*, any of the desired lamps *c*, c^1, c^2 or c^3 of Fig. 1 will be made to burn. A switch operated by each magnet respectively, a locking circuit for each magnet, and special mechanism to render the preceding magnet inoperative, are the principle features disclosed.

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Andrews' Steel Rod Telephone
Operator's Revolving Chair

Steel Foot Rest—Seat and Back Readily Adjustable to Occupant—Height of Chair Easily Regulated. Frame work made of Bessemer Steel, ⅜ (three-eighths) inch Rods twisted and interwoven. Wood work, oak, birch or mahogany finish, as preferred. Metal work heavily plated, Japanese copper finish.

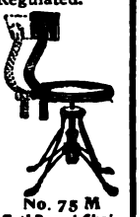
The Most Comfortable High Chair Made

The Most Attractive and Convenient

INDESTRUCTABLE—Nothing to get Broken

24 in. high *28 in. high*

Warranted for 10 years. Send for Complete Catalogue and Prices.



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No. 78 M

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Every time you use or buy telephone construction iron, remember I am the maker of the "BULL TONGUE" Land Anchor, and also sell everything else in telephone construction iron.

My Anchor is the best and cheapest made. It is easier and quicker to instal, and holds better than any made.

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with yourself as we are in the manufacture of *International* Apparatus. Give us the opportunity of estimating on your next order for telephones or switchboards. Recent installations in the U. S. and Foreign Countries are convincing.

International Telephone Mfg. Co.

HARRISON AND CLINTON STS.

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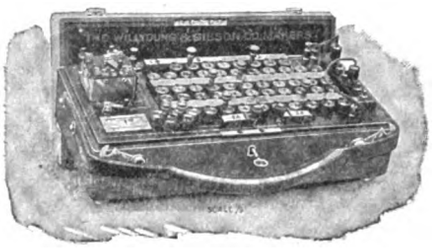
TELEPHONE TROUBLES



STANDARD W. U. TEST SET.

(Circular 500A)

We have a well-organized factory and trained staff whose principal business it is to keep telephone men and telephone systems out of "trouble." We never fail where people are willing to be helped. We help all along the line—our instruments and methods test the copper for conductivity and the sheathing for insulation before the cable leaves the factory; Willyoung instruments test the receiver magnets and coils, the "drop" resistances, the condenser capacities, etc. If anything goes wrong during installation we tell you just where it is; if anything ever gives out on the completed system we tell you where *that* is.

CAN YOU AFFORD TO DO WITHOUT US?

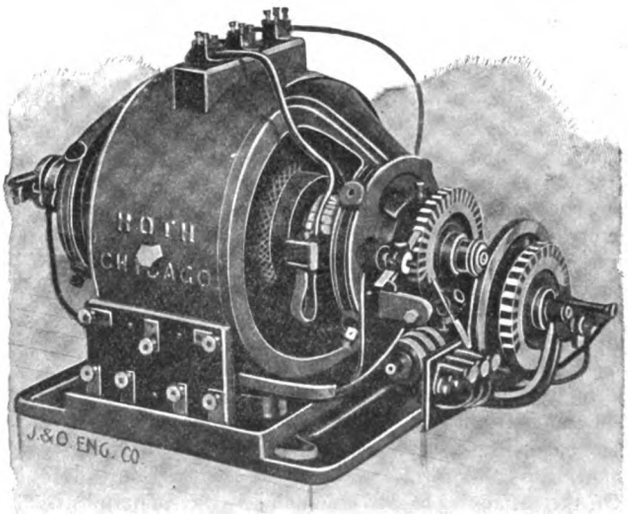
We make Test Sets, Ohmmeters, Fault Locaters of all kinds, Galvanometers, Faradmeters, Electrometers, in short, everything in the Test Instrument Line for either portable or laboratory use; special instruments for any purpose from our own or customer's designs.

Our Catalog Matter is a Liberal Education.

ADDRESS TELEPHONE DEPARTMENT

THE WILLYOUNG & GIBSON CO.

38 West 13th Street, New York City



REASON it out for yourself, and you will find that if

OTHER manufacturers claim as much for their Power Apparatus,

THAT their prices are 'way out of proportion with ours;

HENCE if you need the best at the right figure,

YOU WILL BUY ROTH.

We design and manufacture motors, generators, ringing machines for either alternating or direct current, tone and busy test apparatus. Send for catalogue.

ROTH BROS. & COMPANY, Inc.

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IN THE MANUFACTURING FIELD

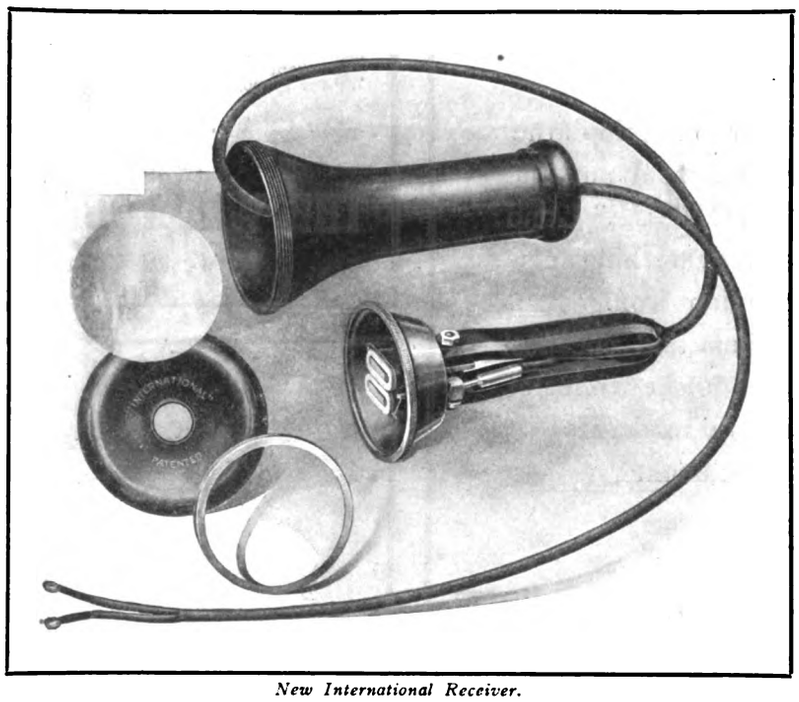
"SUCCESS LIES IN THE KNOWLEDGE OF OUR TOOLS"

AN IMPROVED RECEIVER.

AMONG the large number of various types and makes of telephone receivers on the market the instrument recently evolved by the International Telephone Manufacturing Company, of Chicago, deserves careful attention.

While it does not greatly vary in general principle from other standard receivers, it has a number of improved distinctive features in its design and the method of manufacture, that are of vital importance to the efficiency and durability of an instrument of this kind and a brief description will be interesting.

The accompanying cut shows the receiver partly disassembled. All the parts take their bearing from the head of the bell-shaped metal cup containing the coils. This cup is formed up of No. 14 sheet brass stock, and is machined down to make it perfectly accurate in the spacing between the bottom, which supports the bobbins, and the edge forming the support for the diaphragm.



New International Receiver.

The coil spool cores are milled to the proper length, making them all absolutely uniform. This construction makes a receiver from which the coils may be removed, and replaced with others, without filing or grinding any of the parts to fit.

The spool cores are swedged in a special die, forming an accurate support, or resting stop, for the spool, and also for the core fibre head. The cores, with the fibre bottom head and the fibre and nickel-plated top heads, are assembled in a special tool with the punch press, swedging all parts to make the spools perfectly solid and uniform in size in every particular.

The spools are wound with silk magnet wire to the proper resistance for the system for which the parts are intended.

On the metal cup base are mounted two terminal posts. These terminal posts are provided with a screw connection for a looped cord, or the regular cord with tips may be conveniently used. The terminal posts extend through the base, from which they are insulated by mica washers. The spool wires are soldered directly to the cord terminal pins inside of the base, thus avoiding all danger of parts accidentally becoming disconnected.

The magnet is of the horseshoe type and is of extra heavy stock, making an exceedingly powerful receiver. The magnet, together with the spools which pass through the cup base, are securely drawn into proper position and firmly clamped to the base by a heavy binding screw passing through these parts and terminating in a heavy hexagon nut. When the parts are so assembled and fastened, the receiver is always in its proper adjustment.

The diaphragm is clamped to the cup base by a heavy brass clamp ring, thus entirely avoiding dependance on the shell for the adjustment or permanency of any of the receiver's parts.

The working parts, which are all self-contained, are entirely enclosed in the shell and cap, leaving no binding posts nor metal parts exposed, and no strain on the shell.

It can readily be seen that a receiver of this design, with the high class of material and workmanship used in all "International" apparatus, is one of the most efficient and durable equipments of its kind.

THE MANUFACTURE OF TELEPHONE CABLE.

A VERY interesting booklet has recently been issued by the Stromberg-Carlson Telephone Manufacturing Company. The development of cable for telephone use is briefly traced from a historical standpoint, and this leads to a consideration of the electrical, mechanical and other requirements which must be met in its manufacture. The methods which the Stromberg-Carlson Company has inaugurated to secure the fulfillment of these requirements are discussed in an exceptionally satisfactory manner in the text, and the illustrations are so clear, numerous and well chosen that a very good idea of the successive steps in the building up and preparation for shipment of a cable may be obtained from them alone. The booklet is unusually attractive in all its details, and should be of practical use to anyone at all interested in the subject which it treats. It may be obtained without charge by writing to the company's headquarters at Rochester, N. Y.

A NEW MONARCH CATALOGUE.

THE issuing of a new telephone catalogue by the Monarch Telephone Manufacturing Company brings to mind the rapid growth of this company during the five years of its existence. It started in business with a single part of a telephone, the ringer, and for a time sold nothing but this part. The Monarch ringer soon became a factor in the telephone field, and after it was thoroughly established, the company took up the manufacture of a generator. The Yaxley generator was a fit companion for the ringer, and so it was that the two important parts of the ringing circuit were produced and placed on the market.

The company later designed and built a transmitter, and it was then only a short time until an induction coil, hook switch and arrester were added. Although the company was at this time making all the parts of a magneto telephone, the assembly of the Monarch telephone was not begun until the fall of 1902. Up to that time the entire output of the factory was taken by manu-

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SUMTER

SOLD ON QUALITY—NOT ON PRICE

OH YES.

We have made telephones for rural and toll line work for the past seven years. Our thousands of satisfied customers will gladly testify to their many qualities; from the Pacific to the Gulf, "Sumter" stands for "QUALITY" and satisfaction.

The SUMTER FACTORIES

THE SUMTER TELEPHONE MANUFACTURING CO.

SUMTER, S.C., U.S.A.

TELEPHONES, SWITCHBOARDS

MONARCH ELECTRIC & WIRE CO.

WIRE

SUPPLIES

When You Build a House.

When you build a house it is to your advantage to know the quality of the material used in its construction, as well as its cost. Well, it is equally important that you should know about the quality of the supplies you will need to build a telephone line. Our experience in quality and price is at your disposal. If you write us when in the market, we will give you the exact information that will aid you in building a line that is right. WHEN YOU WANT IT, WE HAVE IT AND CAN SHIP WITHOUT DELAY.

125-127 SO. CLINTON ST. CHICAGO, ILL.

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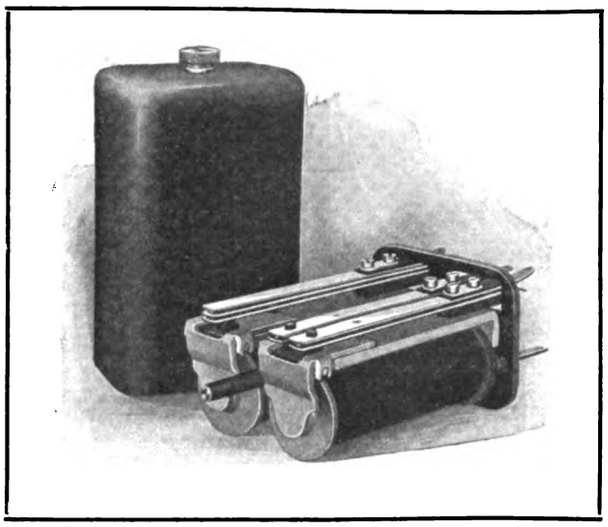
facturing companies and used in other telephones. At this juncture the Monarch Company devised and patented a method of assembly for a compact type telephone. The idea is now undoubtedly familiar to every one, as it has been advertised, tried and the manufacturers claim that it has proven successful in every way. Briefly, this idea is to mount the parts upon removable shelves, which can be slipped from the cabinet without breaking any soldered connections and without disturbing any of the permanent wiring. It is fully described in the new catalogue and will interest any who are not already acquainted with it.

The catalogue is now being printed, and will be ready for distribution about Nov. 15. Copies will be sent to those who forward their names and addresses to the Monarch Telephone Manufacturing Company, 10-16 South Clinton street, Chicago.

THE NEW DEAN RELAY.

THE character of service given by a modern multiple switchboard is determined to a considerable degree by the number of complaints received. One of the most economical and satisfactory methods of diminishing this number is by the avoidance of trouble by the use of relays which are satisfactory in operation. The new Dean relay is designed to fulfill the demands of exchange service in the most satisfactory manner, and is at the same time very simple in construction.



Dean Line and Cut-off Relay with Cover Removed.

Dust proof covers are held in place by milled thumb-nuts, which make removal easy. At the same time provision is made against their accidental loss by fastening them in the shell. The movable contacts are located at the extreme front of the relay, where they may be readily inspected when the cover is off. Removal of the armature without the use of tools is not difficult. It rests upon two contact points in such a manner as to give it a correct normal working position with respect to the core. The use of a brass spool head prevents it from coming in direct contact with the core, and allows the use of a very small air gap.

Relay spool terminals are firmly secured by the use of an end provided with two projections like the roots of a tooth, and securely riveted in place in the spool heads. Ends for soldering are fluted and perforated, so that a secure connection of a wire can be quickly made. Altogether the relay presents many attractive features from the standpoint of design, and the manufacturers back their claims for its efficiency with their guarantee. This relay is manufactured by the Dean Electric Company, Elyria, Ohio.

THE MODEL ELECTRIC COMPANY, Burlington, Iowa, has equipped the following exchanges with its selective telephone: Mississippi Valley Telephone Company, Keokuk, Iowa; Fort Madison, Iowa; Burlington, Iowa; Wapello, Iowa; Morning Sun Telephone Company, Morning Sun, Iowa; West Liberty Telephone Exchange, West Liberty, Iowa; Garden City Telephone Exchange, Garden City, Kan.; Johnson County Telephone Co., Iowa City, Iowa: Cedar Rapids and Marion County Telephone Company, Cedar Rapids, Iowa, and Burlington Rural Telephone Company, Augusta, Iowa.

THE WILLIAM ROCHE DRY BATTERY COMPANY has been incorporated to take over the business which has been conducted since 1897 by William Roche, at Nos. 52 and 54 Park Place, New York. The company is organized under the laws of the State of New York, with a full paid capital of $25,000. It has taken over the assets of the business, and will assume all its liabilities. The officers of the corporation are: William Roche, president; Ernest A. Lowe, vice-president; C. Laton Ford, treasurer; William C. Hubbard, secretary.

A MAGAZINE DIRECTORY.

ONE of the most expensive factors in the operation of a telephone system is the directory or subscribers' lists. On account of new subscribers and changed call numbers it is necessary that it should be published at least four times a year. Even with this number of new and revised editions the lists are not and never can be up to date. It is self evident, therefore, that if some means could be secured to reduce the cost of compilation that a monthly edition would be vastly superior from the standpoint of reliability.

To accomplish this purpose the Brooks Publishing Company of St. Louis, Mo., has devised a magazine directory entitled "Anybody's Magazine." Through syndicate arrangements it is enabled to supply a magazine section which is almost self supporting through foreign advertisements, and which is entirely new every month. Sufficient local advertisements can be secured in any community which will more than pay for the cost of corrections to the subscribers' list, and thus the directory becomes a source of revenue instead of a heavy drain upon the resources of a company.

The introduction of reading matter gives the directory an additional value, as it offers a way for the company to talk directly with the subscribers other than through the regular advertising channels. Short items relative to the company's business can be introduced in such a way as to make the subscribers feel that they are as much to be benefitted by the improvements to the plant as are the stockholders. The short stories are good and the illustrations are excellent. These features alone will undoubtedly secure new business.

The publishers solicit inquiries from all companies interested, and will be pleased to send samples upon request.

THE FAHNESTOCK ELECTRIC COMPANY, 132 Havemeyer street, Brooklyn, is mailing to interested parties a folder which gives very interesting illustrations of the manner in which the connection of wires to various types of apparatus may be facilitated by the use of the Fahnestock spring binding post. Illustrations are given showing its familiar use as applied to dry batteries, and also of the Lightning Arrester Block No. 87, made by the American Electric Fuse Company of Muskegon, Mich., and equipped with this device. The names of a number of leading manufacturers of dry batteries who equip their product with these binding posts free of charge are given. In case the device can not be procured on apparatus when desired, write to its manufacturers.

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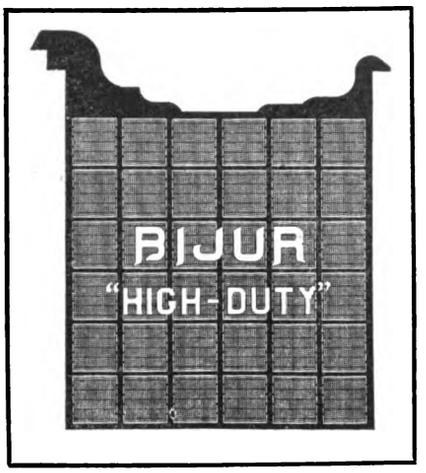
SUPERIOR FOR

TELEPHONE WORK



TELEPHONE WORK

LOW CHARGING VOLTAGE

HIGH CAPACITY LOW INTERNAL RESISTANCE

Easily Kept in Good Condition

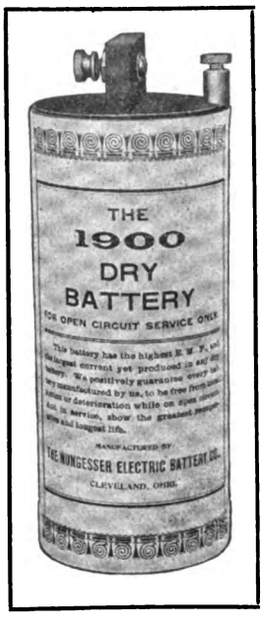
General Storage Battery Co.

Works BOONTON, N. J.

General Offices 42 BROADWAY, N. Y.

Write for Catalogues and Estimates

THE 1900 BATTERY



There are some batteries that cost more than the "1900" and some that cost less, yet none give as good results for the same money.

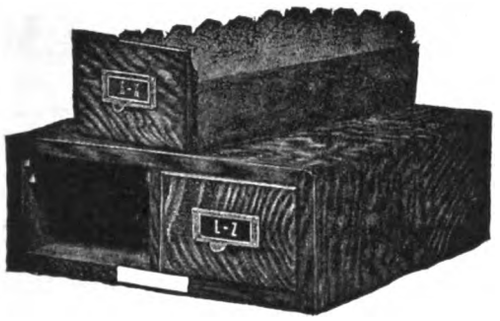
Ask the man who has had experience with batteries about them.

It would pay you to give this battery a thorough trial.

Stromberg-Carlson Telephone Mfg. Co.

General Offices, Rochester, N. Y.

Branch Office, - - Chicago, Ill.



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ESPECIALLY DESIGNED FOR

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The simplest style of record from which to trace every line from 'Phone to Switchboard. Invaluable for systemizing an exchange and keeping it in order.

Our other specialties are:

Blanks, Books and Forms for Telephone Exchange and Toll Line Bookkeeping and Accounting

Toll Tickets
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Special Forms of All Kinds

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THE TELEPHONE PRINTING CO.,

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W. H. CRUMB & COMPANY

Engineers Contractors

TELEPHONE ENGINEERING and CONSTRUCTION

Plans, Specifications and Estimates Promptly Furnished

MERITORIOUS INDEPENDENT TELEPHONE ENTERPRISES FINANCED

1263 Monadnock Bldg., CHICAGO, ILL.

Our Four-Party Selective Telephones Are Dividend Payers for Telephone Companies

We have but recently added to our long list of exchanges the following, who are using our system exclusively: Mississippi Valley Telephone Co., Keokuk, Iowa; Fort Madison, Iowa; Burlington, Iowa; Wapello, Iowa; Morning Sun Telephone Co., Morning Sun, Iowa; West Liberty Telephone Exchange, West Liberty, Iowa; Garden City Telephone Exchange, Garden City, Kansas; Johnson Telephone Co., Iowa City, Iowa; Cedar Rapids & Marion Telephone Co., Cedar Rapids, Iowa, and Burlington Rural Telephone Co., Augusta, Iowa. We also make a selective extension bell which you can use on your old telephone. We are always pleased to answer any inquiries or give any information regarding our system.

MODEL ELECTRIC CO., 204 NORTH MAIN STREET BURLINGTON, IOWA

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FINANCIAL.

LOUISVILLE, KY.—The directors of the Louisville Home Telephone Company have taken further action with a view to listing the stock and bonds on the St. Louis Stock Exchange.

NEW ULM, MINN.—The New Ulm Telephone Company has increased its capital stock from $50,000 to $100,000. The company will spend a considerable sum in perfecting its system.

DILLON, MONT.—The report of the first month's business done over the Southern Montana Telephone Company's lines which connect Dillon and Big Hole Basin points, shows a total of $135 in tolls, which gives a most satisfactory return on the investment.

CHARLOTTEVILLE, N. Y.—The Charlotte Valley Telephone Company will increase its stock to $10,000.

FRANCHISES.

CORONA, CAL.—A telephone franchise has been granted to A. C. Wood. Mr. Wood represents the local Home Telephone Company, which will soon incorporate with $25,000 capital stock. The incorporators will be: F. A. Perkins, A. C. Wood, H. A. Prizer, J. C. Gleason and John P. Triolo.

SPRING GROVE, ILL.—The Spring Grove Telephone Company, of Spring Grove, has been granted a telephone franchise in the village of Richmond, Ill.

COFFEYVILLE, KANS.—The Home Telephone Company has been granted a franchise to construct a telephone system in Coffeyville.

WINDHAM, ME.—The Windham Telephone Company, recently incorporated with a capital stock of $10,000, has been granted a franchise at Windham, and will at once begin the installation of its system.

SAUK RAPIDS, MINN.—The Tri-State Telephone Company of St. Paul and Minneapolis has applied for a franchise at Sauk Rapids.

FLEMINGTON, N. J.—The Lebanon Telephone Company has been granted a franchise to install a telephone system in Flemington.

BUFFALO, N. Y.—The Frontier Telephone Company has been granted permission to install street telephones on many of the streets in Buffalo.

LANCASTER, N. Y.—The Interocean Telephone Company has been granted a franchise at Lancaster, and will install an exchange at that point.

WAYNESBURG, PA.—It is quite probable that either the Tri-State or Wheeling Telephone Company will apply for a franchise, and build a new Independent system at Waynesburg.

MICA AND FREEMAN, S. C.—The Richland Telephone Company, of Richmond, has made application for a franchise in the towns of Mica and Freeman.

TERRELL, TEXAS.—M. A. Joy, of Terrell, Texas, has made application for a telephone franchise in that city.

BELLINGHAM, WASH.—The Farmers' Mutual Telephone Company has applied for a twenty-five year franchise in Bellingham.

OLYMPIA, WASH.—The Home Telephone & Telegraph Company has made application for a telephone franchise.

SEATTLE, WASH.—A franchise on the highways between Seattle and Renton has been granted Ralph D. Nichols. A company called the Citizens' Telephone Company will be formed, and construction work commenced at once.

ELECTIONS.

CLINTON, MO.—At the annual meeting of the Independent Telephone Companies, held at Clinton, G. W. Scruggs was elected President, W. B. Scruggs, Vice-President, and M. L. Golladay, Secretary and Treasurer.

LITTLETOWN, W. VA.—The Union Telephone Company has elected the following officers: President, Louis Delbrugge; Secretary, Charles Sturm; Treasurer, Carl Thompson; General Manager, Dr. Lemley. This company has just been organized.

RACINE, WIS.—The Citizens' Telephone Company has elected the following officers: President, J. B. Simmons; Vice-President, Josiah Hocking; Secretary, G. V. Kradwell; Treasurer, C. R. Carpenter.

NEW COMPANIES.

NEEPAWA, MAN., CANADA.—The town council is sending out circulars with a view to starting a movement for municipal telephones in Manitoba towns. Address G. Belton.

ROBINSON, ILL.—The Crawford County Mutual Telephone Company has been organized with a capital stock of $50,000. The company expects to connect all the farmers lines with Robinson. President, F. M. Lewis; Treasurer, William Long.

EVANSVILLE, IND.—The Pocket Long Distance Telephone Company has been organized with a capital stock of $20,000, to be later increased to $50,000. Directors: Allen Gray, Evansville; R. M. Parret and John F. Ewing, Princeton; Philip Dilley and H. Landgrebe, Huntingburg; Geo. J. Nichols, Petersburg; A. J. Peyton, Rockport. The company will build long distance lines in Vanderburg, Posey, Gibson, Pike, Warrick, Spencer, Dubois and Crawford Counties in Indiana. The headquarters of the company will be at Evansville, where a new franchise will be sought.

LEITER'S FORD, IND.—The Leiter's Ford Telephone Company has been incorporated with a capital stock of $2,000. Directors: B. F. Overmeyer, John B. Campbell and Loreys Luckenbill.

WINGO, KY.—The Mullin County Exchange for rural lines has been organized. R. C. Mullin, Wingo, Ky., President.

WINGO, KY.—The Kitts-Mullin Telephone Company, of Wingo and Water Valley, has been organized. Monroe Kitts, Water Valley, Ky., President.

WINGO, KY.—The Star Telephone Company, of Wingo, has been organized, John Walker, President, Wingo, Ky.

CENTER LOVELL, ME.—The Lovell Telephone & Telegraph Company has been organized with a capital stock of $5,000. Officers: President, C. P. Hubbard, of Lovell; Treasurer, J. C. Mason, of North Lovell.

DENMARK, ME.—The Denmark Telephone Company has been incorporated with a capital stock of $10,000. President, E. L. Head, Denmark; treasurer, C. L. Wentworth; clerk, M. M. Wentworth, Denmark, Me.

NEW PRAGUE, MINN.—The Tri-County Telephone Company has been incorporated with a capital stock of $100,000. Incorporators: S. A. Votapek, Albert Rybak and A. J. Edgerton, all of New Prague.

RITCHEY, MO.—The Newton County Enterprise Telephone Company, of Ritchey, has been incorporated with a capital stock of $3,500. Incorporators: F. A. Boehning, J. B. Hancock, W. I. Pogue, J. M. Curtis, Fred Chandler, F. E. Wasson and others.

FOSTER, N. Y.—The Foster Valley Telephone Company, Foster, N. Y., has been incorporated with a capital stock of $1,500. Incorporators: Vernon Cornell, Albert Mason and Jesse Walker, all of Union Center, N. Y.

NORTH WOLCOTT, N. Y.—The Red Creek & North Wolcott Telephone Company, North Wolcott, has been organized with a capital stock of $500. Directors: Burton Ford, N. J. Field and Chas. Weaver, of North Wolcott.

PLAINVILLE, N. Y.—The Plainville & Meridian Telephone Association, Plainville, N. Y., has been incorporated with a capital stock of $1,200. Incorporators: Geo. W. Simmons, Geo. R. Calkins, Cato, N. Y., and Charles P. Davis and others, of Plainville, N. Y.

TICONDEROGA, N. Y.—The Ticonderoga Home Telephone Company, Ticonderoga, N. Y., has been incorporated with a capital stock of $25,000. Directors: J. A. McLaughlin, Putnam; R. N. Clemens, Dresden; D. C. Bascom, Ticonderoga.

VARYSBURG, N. Y.—The Tonawanda Valley Telephone Company has been incorporated with headquarters at Varysburg.

CARRINGTON, N. D.—The North Dakota Central Telephone Company has been incorporated with a capital stock of $50,000. Incorporators:

NEWS—WANTED

THE matter contained upon the Message and Operating Field pages of this paper is contributed largely by our special correspondents. We believe, however, that there are many valuable items of telephonic interest which are never brought to the attention of the public. There is no reason why this condition should exist, and the Editor, therefore, invites all telephone companies, and the officials of such companies, to furnish any information that they can consistently make public relative to financial statistics, new construction, elections, franchises and personal items.

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Five Yards ***Prompt Shipments***

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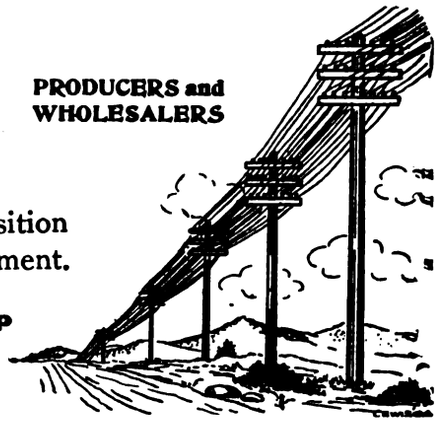

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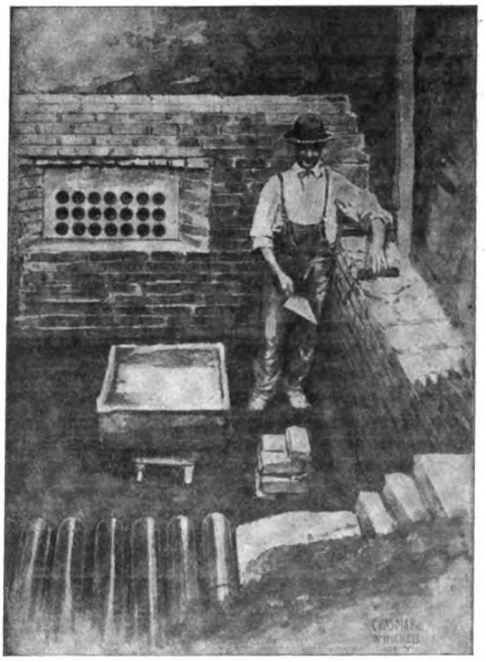

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THE WEEK'S MESSAGES

C. E. Leslie, M. J. Leslie, S. S. Cowee, C. C. Leslie, Carrington, N. D., and O. L. Robinson, Madison, Wis.

AUSTIN, TEXAS.—All of the larger Independent telephone lines in Texas are to be consolidated into one company, the charter for which has been filed. The South Texas Telephone Company is the new corporate name. Principal office at Austin. Capital stock $400,000. Incorporators: J. A. Quisenberry, of Danville, Ky.; A. E. Schaeffer, of Waxakoneto, Ohio; W. B. Stephens, F. C. Smith, of San Antonio, and J. E. Boynton, of Waco.

COMBINATIONS.

COLUMBUS, IND.—The Citizens' Telephone Company, it is expected, will shortly acquire the Hope Telephone Company, of Hope.

STILLWATER, MINN.—The Tri-State Telephone Company, which has a long distance office in Stillwater, has acquired possession of all the Wisconsin and Minnesota property of the Mutual Telephone Company. It is expected that the Tri-State Company will apply for a charter to install an exchange in Stillwater.

BRYAN, O.—The Bryan Telephone Company, of Bryan, has purchased the Pioneer Telephone Company, of Pioneer.

PERSONAL.

MYRON DAVIS, formerly manager of the Cambria County Telephone & Telegraph Company, has accepted a position as superintendent for the Indiana Telephone Company at Indiana, Pa.

F. E. LEONARD, manager of the Salt Lake exchange, has been promoted to the position of superintendent of construction for the Rocky Mountain Bell Company.

T. L. MITCHELL, of Tyler, has been appointed manager of the Citizens' Telephone Company at Houston, Texas.

RAYMOND NICHOLSON has been promoted from the management of the Central Union Telephone Company's lines in Wabash to Goshen, Ind.

S. W. STEARNS, of Buffalo, has been appointed manager of the Bell Telephone Company's Twin City branch.

HARRY SUMMERS is to be general superintendent for the Rocky Mountain Bell Telephone Company, at Salt Lake City.

MARTIN S. TAYLOR has left the Philadelphia Bell Telephone Company to accept the position of general manager of the Fayette Telephone Company.

A. W. WOBLY, of Chicago, has been appointed manager of the Salt Lake exchange, Salt Lake City.

New Construction in the Field

SELMA, ALA.—A new telephone line is proposed, to connect this city with Thomaston, Marengo County, and include Selma, Myrtlewood, Linden and Consul.

RIVERSIDE, CAL.—The Home Telephone Company is about to add equipment of 500 additional telephones to its system, increasing the equipment to 1,600 instruments.

NAPINKA, MAN., CANADA.—Messrs. Menarey and Estlin, of the Melita-Arthur Telephone Company, Melita, Man., have a proposition before the town council to install a system in that town, also to build a long distance line to connect with Melita.

PORT ARTHUR, ONT., CANADA.—The Ratepayers have approved a by-law to spend $15,000 on improving the municipal telephone service. Address Mayor McKeague.

COUNCIL BLUFFS, IA.—The Council Bluffs Independent Telephone Company is to establish a branch station at Crescent City, and will extend its lines as far as Honey Creek.

GRISWOLD, IA.—The Atlantic Griswold Telephone Company is building a line to Carson.

LEWIS, IA.—The Fletcher Telephone Company is to extend its lines.

MT. CARROLL, ILL.—The Carroll County Independent Telephone Company will construct a toll line all over the county. It is estimated that several thousand dollars will be spent in improvements to the system.

BROWNSTONE, IND.—The Brownstone Telephone Company is to connect its lines with the Uniontown Telephone Company at Crothersville.

INDEPENDENCE, IND.—The Home Telephone Company is at work on its new exchange building, which will serve 1,500 patrons. The company will also extend lines through Oklahoma to California as rapidly as possible.

LAFAYETTE, IND.—The Lafayette Telephone Company has purchased a three-story building, and will install an up-to-date telephone exchange.

PADUCAH, KY.—The Paducah Home Telephone Company, which bought over the properties of the People's Independent Telephone Company, according to its manager, will spend $50,000 in improving the local system.

DETROIT, MICH.—The telephone exchange planned by the new Home Telephone Company for Detroit will have a capacity of 18,000 telephones. It is anticipated that the engineers of the company will have estimates ready in about six weeks.

PLAINWELL, MICH.—The Norton Rural Telephone Company will build an exchange in Plainwell.

HATTIESBURG, MISS.—The Home Telephone Company, of Meridian, Miss., is to build a long distance line to Hattiesburg.

DILLON, MONT.—The Southern Montana Telephone Company proposes to build about 25 miles more out from Wisdom into what is known as the "highlands" in the Big Hole basin, connecting about 20 additional ranches to its system.

BEATRICE, NEB.—The Home Telephone Company is building a line from Beatrice to Lincoln.

HENNIKER, N. H.—The Henniker Telephone Company has made arrangements with the West Hopkinton Telephone Company for a through telephone line from Hillsborough Bridge to Contoocook Village.

LEBANON, N. J.—The Lebanon Telephone Company is extending its lines to Marmersville and Fairmount.

CALEDONIA, N. Y.—The Inter-Ocean Telephone Company is to put in an exchange at Caledonia under the name of the Livingston County Telephone Company.

COHOES, N. Y.—The Home Telephone Company is increasing the capacity of its switchboard.

DALTON, N. Y.—The Dalton Telephone Company is to build a line to Birdsall.

GARRATTSVILLE, N. Y.—A branch of the New Lisbon Farm Telephone Company is being constructed from Garrattsville to North Edmeston.

LANCASTER, N. Y.—The Inter-Ocean Telephone Company has started work on its new telephone exchange, and expects soon to connect with Buffalo.

WEEDSPORT, N. Y.—The Weedsport Telephone Company has commenced the installation of subscribers' telephones.

GILBERT, O.—The Gilbert Telephone Company is extending its lines towards Adamsville.

NEW LEXINGTON, OHIO.—The Perry County Telephone Company is to spend $8,000 in improving its system. A new switchboard will be installed.

ZANESVILLE, O.—The Zanesville Telephone & Telegraph Company is to spend $50,000 in the extension of its system. It is estimated that room will be made to handle between 1,000 and 1,500 additional telephones in the Zanesville exchange. The company recently declared a quarterly dividend of 1½ per cent.

ARAPAHO, OKLA.—The Consolidated Telephone Company is making extensive repairs to its line.

DURHAM, PA.—Edwin C. Hollenbach, of Durham, will build a telephone line from Durham to Applebachsville.

INDIANA, PA.—The Indiana Telephone Company is to thoroughly overhaul its system, replacing old telephones with new ones. The company is also building a line from Barnesboro to Clymer.

QUEMAHONING, PA.—A telephone exchange is to be installed by the Citizens' Telephone Company, of Quemahoning, at Stahl's Church, Somerset County. The company organized recently with the following officers: President, J. L. Williamson; secretary, J. J. Stahl; treasurer, John Stahl; general manager, S. G. Shetler.

RALSTON, PA.—The Ralston Telephone line will have several extensions in the near future, one of which will be the Bottle Run, four miles in length.

BATESBURG, S. C.—The Batesburg Telephone Company, which has just completed a long distance line from Batesburg to Delmar, is to build a line to Mt. Willing.

YANKTON, S. D.—The Independent Telephone Company will have its new line between this place and Sioux City completed within a short time.

JACKSON, TENN.—The Home Telephone Company, which has just completed a long distance line from Jackson to Memphis, expects to build other long distance lines.

EVERETT, WASH.—The Farmers' Mutual Telephone Company is soon to commence work on its new system.

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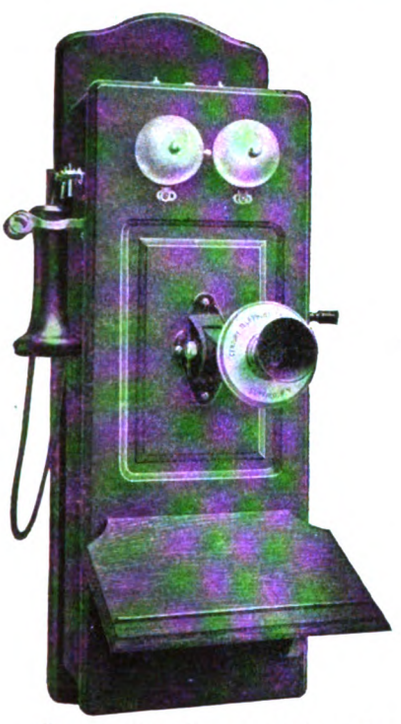
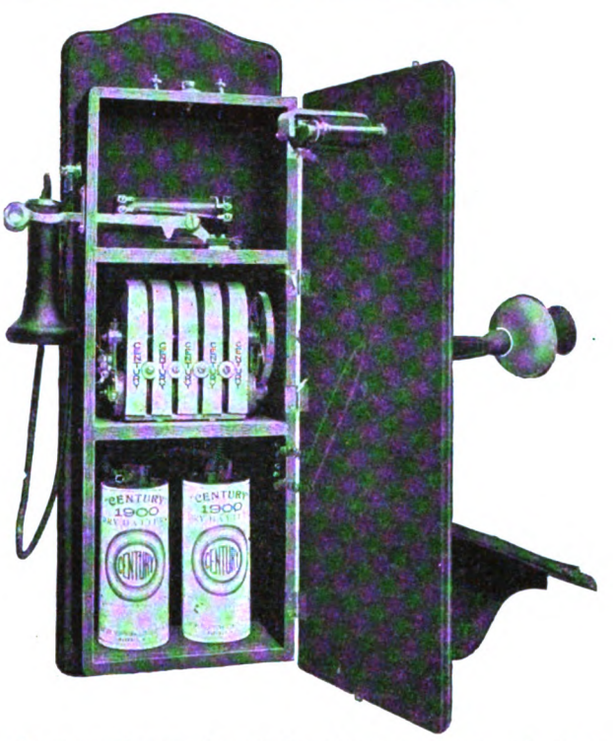
MAGNETO TELEPHONES





The quality of your service, also the earning power of your exchange, depends largely upon the apparatus you are using.

Therefore, is it not good policy to use nothing but the very best apparatus?

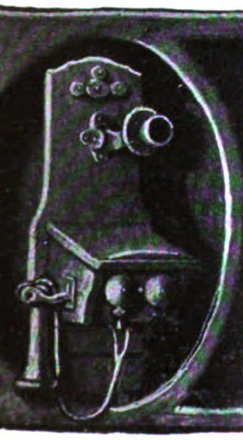
Our No. 65 magneto telephones will give your subscribers the very best service. Their use will also increase your dividends by reducing to the minimum your maintenance charges.

Our No. 65 magneto telephones have been carefully developed and perfected to such an extent that they can be relied upon for perfect service at all times.

These telephones are made up in all the different types, for all classes of service.

You may make a thorough test of these telephones; we will send you one or two series bridging instruments on 60 days' trial, charges prepaid.

Don't you think this offer is worth considering? Send us an order.



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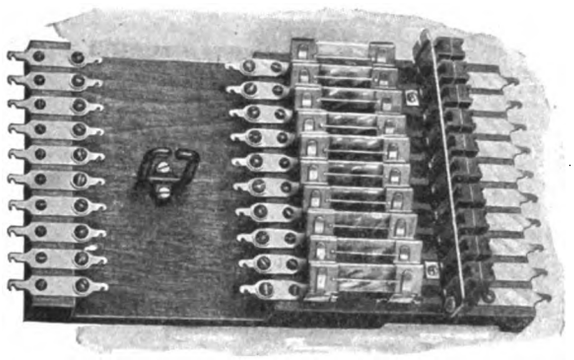
ARRESTER BOARD

A simple, convenient equipment for magneto exchanges.

Put up in sections of five metallic lines, each to correspond to drop and jack sections of the switchboard.

All connectors, carbon holders, etc., are made of heavy brass.

The fuse clips are of a new design. The clips holding the fuses may be bent if they become loose. A perfect contact is always insured.



The fuses are set at an angle. A blown fuse can be seen at a glance and a new one inserted without difficulty.

The ground strip is a broad piece of brass with a slot at one end and a screw at the other for connecting to other sections.

A slight pressure is on the carbons at all times. Perfect ground connections are thus provided.

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An insulated ring is mounted in the middle of each section for the accommodation of the jumper wires.

Substantial construction and good workmanship are apparent.

This arrester board and all other Monarch switchboard apparatus are fully described in the new catalogue. A copy will be mailed upon request.

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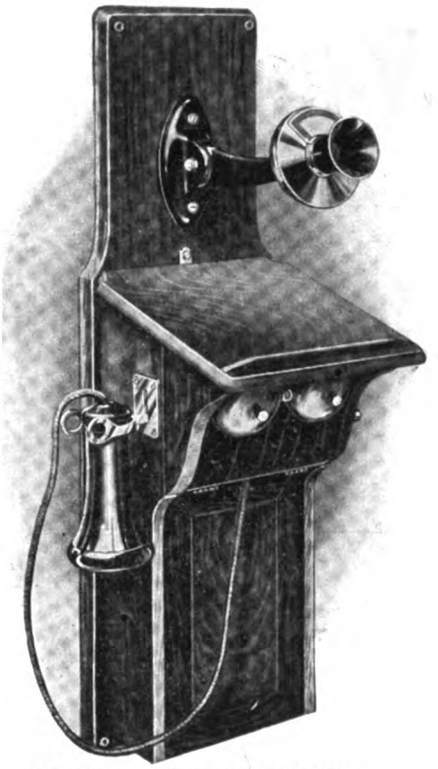
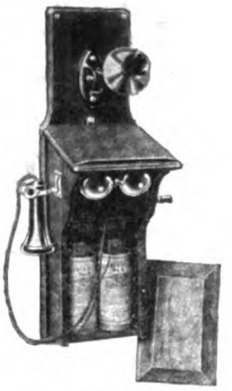
DEAN TELEPHONE APPARATUS

Dean Common Battery Type Magneto Telephone.

Upper compartment open, exposing generator, ringer, hook switch, induction coil, arrester and line binding posts.



No. Fourteen-Twenty Type Telephone.



Battery box open. The cover is removed by sliding downward. It is held in place by a spring catch.

The telephone shown in the above illustrations, known as our Number Fourteen-Twenty Type, is made for all kinds of magneto service. Its apparatus is interchangeable with that used in our compact type telephones, thereby guaranteeing the same high efficiency.

The design of the cabinet is along graceful lines, while the finish is exceedingly fine so as to give a most pleasing appearance. The woodwork is of the best seasoned quarter sawed oak or walnut, carefully put together so as to keep its shape indefinitely.

Our folder No. 4 describes this telephone in detail.

THE DEAN ELECTRIC COMPANY
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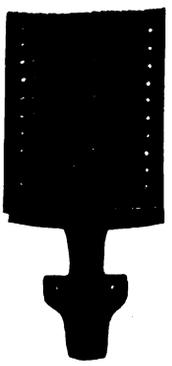

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TYPE A—10-Pair Hall Cable Box.

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Designed and Patented by Frank B. Hall. Made in 10 to 50 Pairs, Side Bracket, 25 to 100 Pairs, Pole Top. Distributing Rings and Special Hardware for Cable Construction.

Sole Manufacturers,

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TYPE B—86-Pair Hall Cable Box.

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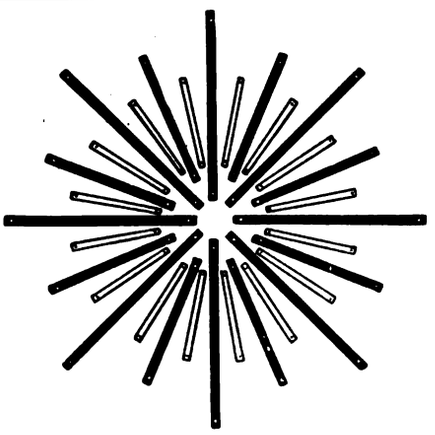
Highest Grade

Lowest Prices

Qickest Delivery



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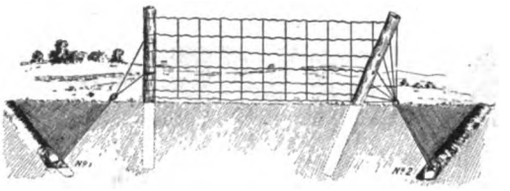

"HERCULES" Anchors are easy set.

"HERCULES" Anchors pull against solid earth.

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800 PAY STATIONS IN ONE ORDER

New Model Pay-station
1 to 5 Slot.

We received this order Nov. 1st, from one of our customers who has used them for years, and bought 900 last month.

IF IT PAYS THEM IT WILL PAY YOU

Write for catalogue and prices or let us send you one on trial.

Baird Manufacturing Co.

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The V-B Express Drop and Jack

ITS ADVANTAGES

¶ It has a coiled spring restoring device, absolutely positive, simple, always in adjustment.
¶ The coil, wound on cardboard tube, may be removed without disturbing the magnetic adjustment—the core being rigidly fastened to the shell—by just a turn of the hand.
¶ The armature, maintained by special bayonet catches, in the same relative position to the shell and core, is as easily removed and replaced.
¶ The drop is most delicately sensitive, responsive to the slightest current.
¶ One side of the night bell circuit is attached to the frame of the drop (made possible by the heavy insulation of cardboard) thus simplifying the possible chances of trouble.
¶ The slides are so arranged as to make the drop perfectly dustproof, an essential factor with a cut-off jack.
¶ The springs are fastened to the end of the brass mounting plate, which in turn is fastened to the drop shell at both ends, making an absolutely rigid construction throughout.
¶ The night-bell contact is platinum to platinum, made by the weight of the shutter supporter on a short leverage, positive in action.
¶ The mounting device allows the drops to be mounted singly.
¶ The drops are made with accurately built tools and dies, so that all parts are interchangeable.
¶ We shall be glad of the opportunity to send a sample drop, and to write in further detail.

The Vought-Berger Company

Makers of First-Award Telephones and Switchboards

LA CROSSE, WIS.

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STERLING ELECTRIC COMPANY
TELEPHONES

STERLING ELECTRIC COMPANY
SWITCHBOARDS

STERLING ELECTRIC COMPANY
PROTECTION

SERVES YOU RIGHT!

STERLING EQUIPMENT

Serves You Right and Will Always Serve You Right

BECAUSE IT IS MADE AND SOLD RIGHT

Prices Not Too High and Not Too Low for Good Equipment

STERLING ELECTRIC CO. - LaFayette, Ind.

THE COLUMBUS EVENING DISPATCH, WEDNESDAY, SEPTEMBER 6, 1905.

TELEPHONE SECURITIES IN GOOD DEMAND ON THE LOCAL STOCK EXGHANGE

Installation of the New System Has Greatly Stimulated Interest in the Company.

Caleb L. McKee & Co. say—"Columbus Citizens' Telephone preferred is in good demand at 103½, while nothing was offered below 105½, and it seems quite firm at the latter figure. The installation of the new system has materially stimulated interest in this security and at the same time has had the effect of tightening it up to a considerable extent, as sellers are very scarce.
"Columbus Railway common is call

Our automatic System;-
always does it,—
strengthens the securities
and Keeps them strong
because there's value
back of them.
It will do the
same for yours.

OUR AUTOMATIC SYSTEM ADOPTED IN THE FOLLOWING CITIES:

Chicago, Ill.
Grand Rapids, Mich.
Columbus, O.
Dayton, O.
Lincoln, Neb.
Portland, Me.
Auburn, N. Y.
Lewiston, Me.
Sioux City, Ia.
Cleburne, Tex.
Columbus, Ga.
South Bend, Ind.
Aberdeen, So. Dako.
Miamisburg, O.
Medford, Wis.
Portland, Ore.
Van Wert, O.
Battle Creek, Mich.
Clayton, Mo.
Pentwater, Mich.
Toronto Jct., Can.
Wilmington, Del.
Riverside, Cal.
Traverse City, Mich.
Auburn, Me.
Fall River, Mass.
New Bedford, Mass.
Los Angeles, Cal.
San Diego, Cal.
Hopkinsville, Ky.
Hazleton, Penn.
Woodstock, N. B.
St. Marys, O.
Westerly, R. I.
Manchester, Ia.
Princeton, N. J.
Albuquerque, N. M.
Allentown, Penn.
Hastings, Neb.
Wausau, Wis.
El Paso, Tex.
Havana, Cuba
Marianao, Cuba, and
Berlin, Germany.

AUTOMATIC ELECTRIC COMPANY
Van Buren and Morgan Streets, CHICAGO, ILL.

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KELLOGG PHILOSOPHY

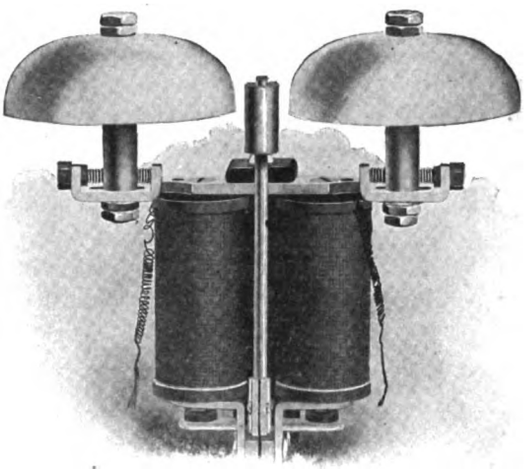
THE NEW

THE BEST IS THE CHEAPEST

KELLOGG HARMONIC RINGER

FOR

PARTY LINES



ADVANTAGES

Simplicity of construction.

The position of the gongs is easily and securely adjusted.

Easy interchangeability of different parties.

The permanent magnet is in metallic contact with the armature.

ADVANTAGES

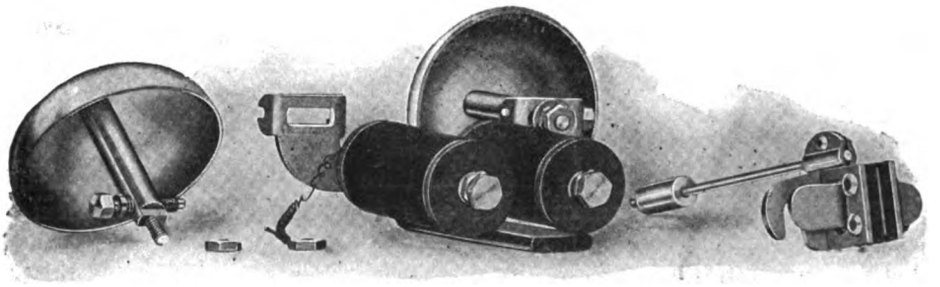
Ease of armature adjustment.

The external appearance is exactly the same as an ordinary single party ringer.

Can be put in any common battery telephone in place of the regular single party ringer.

The different tappers are self-adjusting.

No ground connections are necessary. No springs to get out of adjustment. Each telephone is wired alike. A perfect party line ringer.



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CHICAGO, ILL.

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STROMBERG-CARLSON

The Exchange Manager

Who Wants All the Business He Can Get

will be interested in our new bulletin on Intercommunicating Telephones. It is just such a book as you should have if there is anybody in your town or city needing a system of this kind—and there are. Give us their names, and with your assistance we can land a customer that will mean more rentals and increased dividends for your exchange.

We have the most convincing kind of evidence to offer you that our system is the one for you to put in, or have put in, if it is to be connected with your exchange by trunk lines. Some of our systems have not only been in use for a number of years, but parties using them have tried many others, and are consequently able to make a comparison based upon experience.

A. H. VILAS COMPANY,
MOULDINGS AND PICTURE FRAMES.

Chicago, September 21, 1905.

STROMBERG-CARLSON TEL. MFG. CO., Chicago, Ill.

GENTLEMEN:—In reply to your favor of the 19th, we beg to state that since writing you about two years ago, your telephone system which is installed throughout our factory and warehouse, has been in good working order. We have had your system now for nearly seven years, and it has always given entire satisfaction. We tried many others before that time, but always experienced more or less trouble in operating them.

Yours truly,
A. H. VILAS COMPANY.

Of course the systems we put in to-day are a decided improvement over those we built a number of years ago.

It is remarkable how few telephone companies have ever done anything with this class of apparatus. Why should its development be left to a few of the big Independent companies? Don't think because your exchange is in a small town you have no field to work. There are hundreds of towns in which are located factories, stores, hospitals, etc., that would put in a private system if solicited. Just write and say you are interested and see what we have to offer. We want you to have the bulletin in any event. A postal card as follows will bring it: "Send Bulletin No. 13-B."

TELEPHONE M'F'G. CO.
ROCHESTER, N.Y. CHICAGO, ILL.

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WE MAKE CABLE

Write for the Cable Book!

Stromberg-Carlson Cable

It Will Post You How to Buy

We Mail It Free

Drop us a postal and just say "Send Booklet 79-B."

STROMBERG-CARLSON TELEPHONE MFG'CO.

ROCHESTER., N.Y. CHICAGO., ILL.

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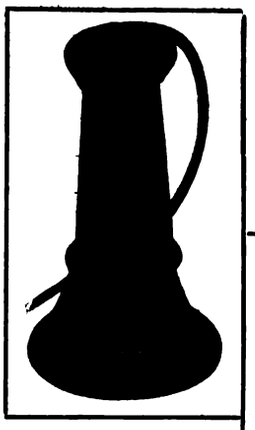
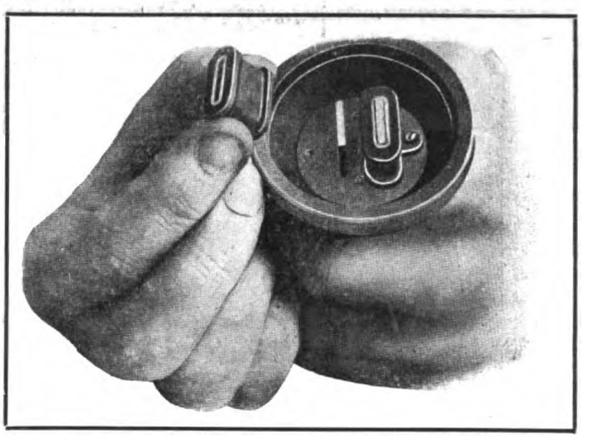


No. 47 NEW TYPE RECEIVER



Has many advantages over the metal-cup Receiver of either the plain or locked type. Cost no more. Illustrated description on request.

Ask for Bulletin 47 T. Better write today to the "Everbest" Supply House

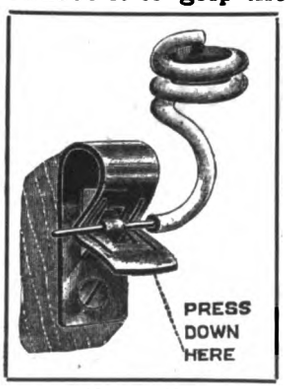
Ewing-Merkle Electric Co.

ST. LOUIS, MO.

Multum in Parvo

In other words much in little. That description fits the **Fahnestock Spring Binding Post** to a T.

It saves time because a simple pressure causes it to grip the wire securely. No tools are required to tighten it up and the wire cannot work loose. As a connection for batteries it has no equal, being as superior to the ordinary screw type as platinum is superior to iron for a contact point. If you ask your dealer to supply your next order of batteries with this post, he will do so, and as it costs no more than the ordinary kind you save money. Samples are sent free, but why doubt our statement when it costs you nothing to try it.

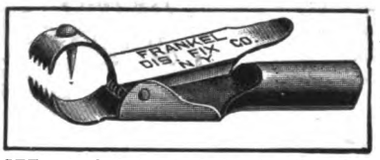


Fahnestock Electric Co.

132 Havemeyer Street, Brooklyn, N. Y.

SAMPLE ON REQUEST

Frankel's Electric Testing Clip



Sample dozens...$1.50 per doz.
Lots of 100....11.00 per 100
Lots of 500....10.00 per 100
Lots of 1000.... 9.00 per 100

Patented Nov. 15, 1904.

GET out of that rut of skinning the wires—IT'S EXPENSIVE. THIS device will save both valuable time and material—THAT'S PROFIT.

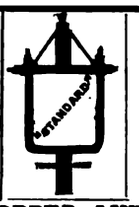
The teeth grip the wire or binding post. The pin pierces the insulation and makes a perfect test connection.

FROM YOUR SUPPLY HOUSE, OR

FRANKEL DISPLAY FIXTURE CO.

718 BROADWAY, NEW YORK

Telephone Wire



and Cables

BARE COPPER LINE WIRE

Weatherproof and Rubber Insulated Wire and Cables

Aerial—Underground—Submarine Lead Covered Cables

TERMINALS—STEEL STRAND—HANGERS

Standard Underground Cable Company,

PITTSBURGH, PA.

BOSTON. NEW YORK. PHILADELPHIA. CHICAGO. ST. LOUIS. SAN FRANCISCO.

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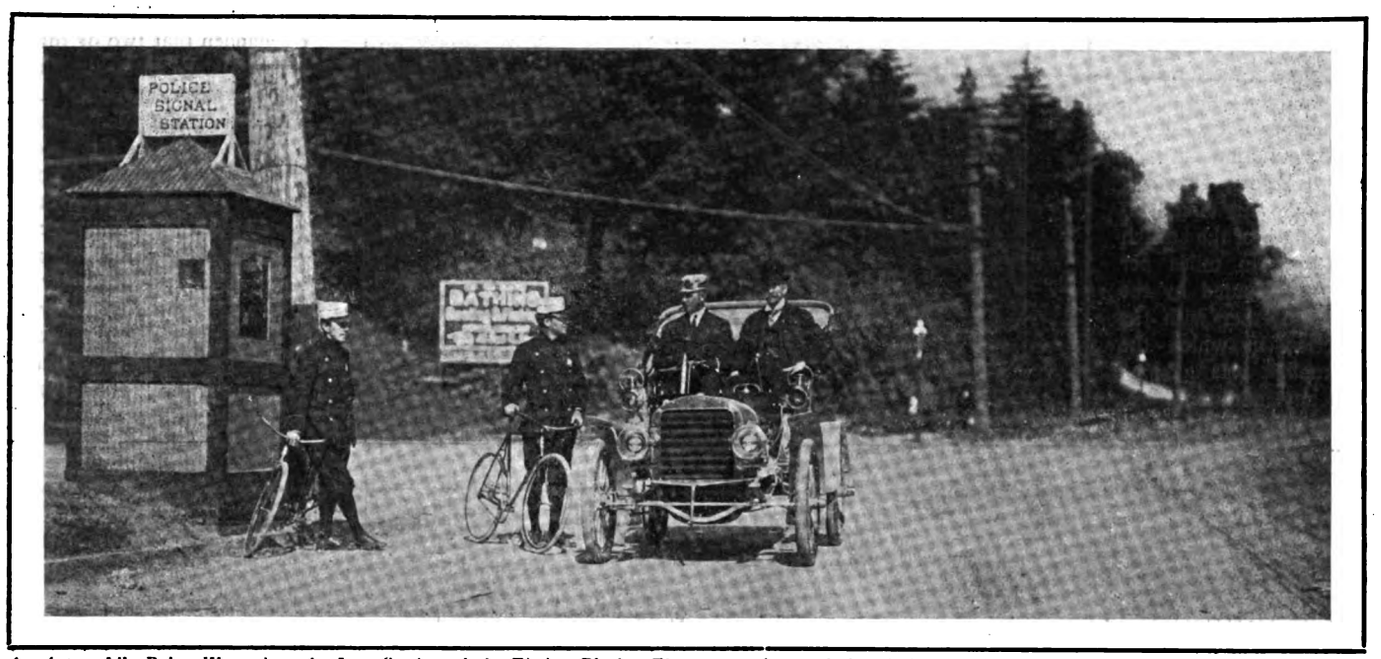
VOLUME XII *SATURDAY, NOVEMBER 11 1905.* *NUMBER 20*

Novel Automobile Trap Used by New York Police

By Karl Christensen.

MAGISTRATE CRANE, of New York, in commenting upon the violation of the automobile speed law, stated substantially as follows: "That the ordinary man was a law abiding citizen until he owned an automobile, but that when riding in it he seemed to be transformed into a demon." However this may be, it is an absolute certainty that a person riding in an automobile seems to lose all sense of perception of the speed at which he is traveling, and that whereas he would, if on foot, condemn the speed of a car which was greater than eight miles an hour as being dangerous, when driving one himself a rate of twenty, thirty or even forty miles an hour does not appear to him excessive.



An Automobile Being Warned at the Last Station of the Timing Block. The car number and description has been received by telephone from station 1.

So reckless had the driving of automobiles become along the boulevards and streets within the limits of the city of New York that it became necessary to place some check upon the owners and operators. To leave it to the guesswork of a policeman as to whether the law was being violated did not appear to be the correct way to handle the trouble, since there were no means of verifying the statement of either the officer or the arrested driver. Police Commissioner McAdoo, in investigating a possible means of allaying this evil of overspeeding, decided to give the Peabody system of speed timing a trial. Briefly stated, the idea is as follows: A stretch of road frequently traveled by automobiles is selected and divided into two sections of any desired length. At each end and at the connecting point of the two sections thus established, observation booths are placed. These booths are in charge of the police and are connected with each other by telephones, which are employed to establish instantaneous communication between them. At the central point there is an officer specially detailed as the timekeeper. It is his duty to handle the stop watches which are used to determine the time it takes an automobile to pass from one given point to another. In the system installed in upper Broadway, New York City, there are at present three stations used for timing purposes, each bearing a number. Station No. 3 is at 183d street and Broadway, Station No. 1 at Sherman avenue and Broadway and Station No. 2 at Dykeman street and Broadway. In the direction named they run from south to north. Between Stations Nos. 1 and 3 the distance is one-half mile and between Stations Nos. 1 and 2 it is one-quarter of a mile. Station No. 1 is the timing point and is situated between the end stations, Nos. 2 and 3, which are the signaling and arresting points.

The operation of the system is as follows: When a car passes either of the end stations, the telephone operator in the booth immediately gives the telephone bell one ring, which indicates that a car has entered a block. This is the signal for the timing station. At the same instant the officer holding the stop watch at Station No. 1 presses a button and takes the time. The officer at the calling station then gives the telephone operator at the timing station the number of the car, its registry and the direction in which it is going. When the car is opposite Station No. 1 the man holding the watch pushes the button again and the elapsed time is noted. On a chart, placed on one of the walls of the booth, is outlined the different speeds in miles per hour, based upon the time in seconds it takes a car to travel distances of one-quarter and one-half miles respectively. By comparing the time given by the stop watch with the time on the chart it is easily determined whether or not the car is travelling within the pre-

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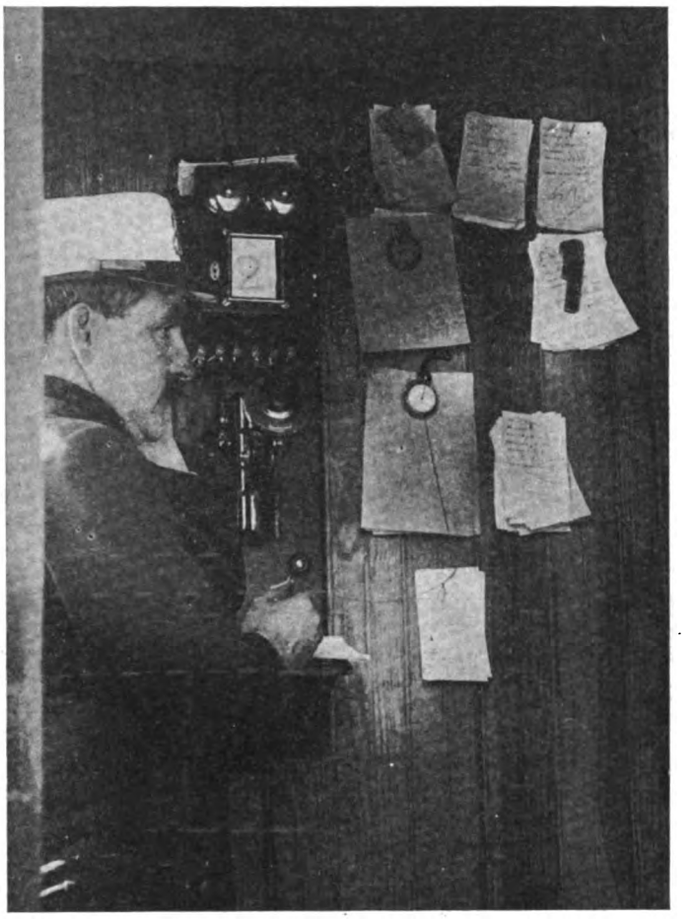
scribed limit of fifteen miles an hour. If it is going faster, the operator at the further end station is notified and he halts the car and warns the party. This warning is a precautionary action, intended to prevent the owner of the car overrunning the speed limit in the future. When a car enters the first block the officer in charge fills out a form, similar to that shown in Fig. 1, giving his name, the date, location of the station, time the car enters the block, its number, place of registry, direction in which it is traveling and any other remarks he believes are necessary. At Station No. 1 a form similar to that shown in Fig. 2 is filled out by the operator. This gives the name of the timer, the date, the location of the timing station, the time the car enters his block, its number, registry, elapsed time in the stretch from signaling station to arriving station, length of the stretch and time in miles per hour computed by the chart, together with the direction in which the automobile was going and any additional remarks he deems necessary. Should the car have exceeded the speed limit, it is halted at the end station and there a complete record of it is taken. The form used is shown in Fig. 3. Here the name of the officer who makes the arrest is given on the first line, together with the date, location, hour and minute, automobile number, registry, maker's name and so on, as evidenced from an examination of the form. These records are kept for future reference, so that if the car owner should again be arrested there can be no question as to his having been notified in the past. The same plan of timing and keeping records is gone through with when the car is going in an opposite direction.



The Interior of Station Two. Officer is in the act of taking the number of an automobile which has exceeded the speed limit in first block.

In the operation of the plan it will frequently happen that two or three cars may enter the timing block in rapid succession. In such a case the timer uses the necessary number of watches and places them in a rack divided into four parts. Above the rack is a slate divided into four squares, each square corresponding with one of the trays below. Within the squares upon the slate are marked the numbers of the cars which are being

Name .....
Date ..... 1905.
Place.....
Hour and minute .....
Automobile No.....
.....*Registry*
Automobile was going.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

Fig. 1. Form used to record particulars when car enters block.

Timer .....
Date ..... 1905.
Place .....
Hour and minute .....
Automobile No.....
.....*Registry*
Elapsed time in stretch ..... *seconds*
Length of stretch .....
Miles per hour .....
**Automobile was going*.....
Remarks:
.....
.....
.....
.....
.....
.....

*Indicate in which direction.

Fig 2. Record slip filled out at timing station, giving details of speed, etc.

Officer.....
Date ..... 1905.
Place .....
Hour and minute .....
Automobile No.....
.....*Registry*
Maker's Name .....
Color of Body .....
Color of Trimming .....
Motive power .....
Capable of seating persons.....
Chauffeur's name .....
" *residence* .....
Number of his license .....
**Automobile was going*.....
Owner's name .....
" *residence* .....

*Indicate in which direction.

Fig. 3. Report filled out when a car is warned for violating the law and kept for reference.

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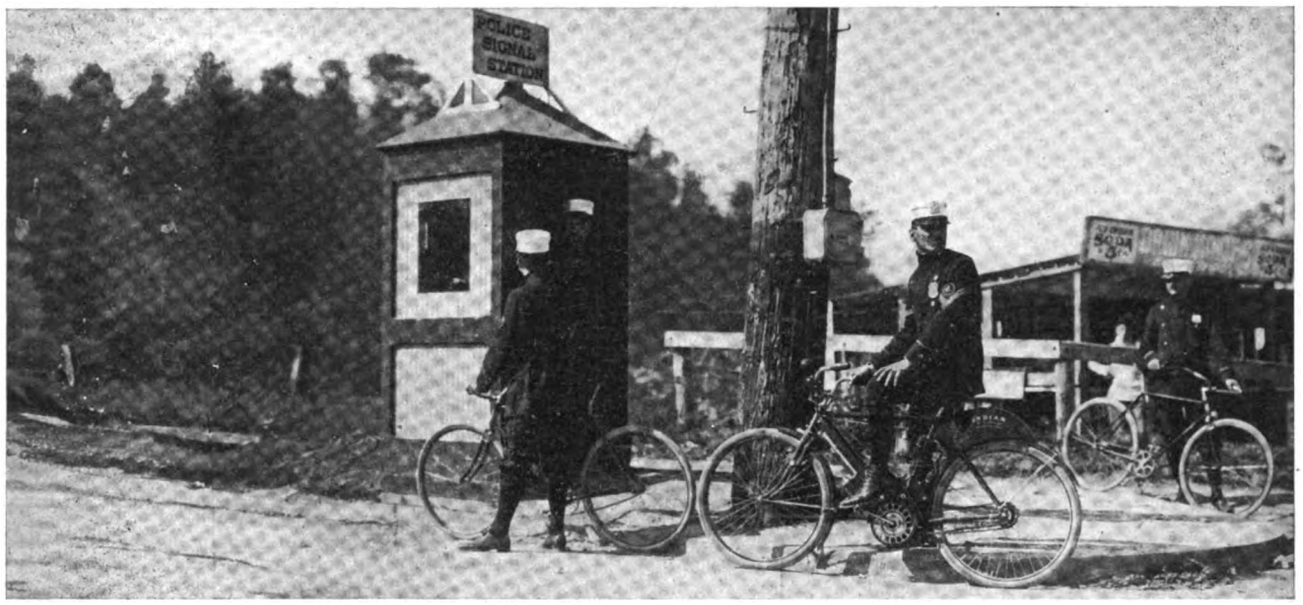
timed, and in this way there is no possibility of confusion in giving the right time of each car. Another reason for this timing scheme is that a car may enter a block after another car and yet pass it before the timing station is reached. To prevent any errors along this line, the car number is also included, so that when a car reaches the central timing station it is very easily seen whether it has kept its relative position with respect to the other cars. It also prevents one car from being checked up for overspeeding when another one is at fault. At each of the stations there are from two to three men. One man at each point is detailed to operate the telephone, one man at the middle station to time and the one or two additional men at the end stations are employed to arrest when necessary.



One of the Automobile Timing Stations. Members of the bicycle squad detailed to make arrests.

Automobilists have made inquiry at the timing stations with respect to the speed at which they were traveling, with a view to keeping within the limit allotted by law. The average speed, so far recorded, has been approximately fourteen miles an hour and the greatest about thirty. The stations are in plain view of those who may travel along the highway, it being considered by the Commissioner of Police preferable to warn the people directly than to attempt to do it in a surreptitious manner. It may be of interest to know that during the month in which the system has been in use 1,400 cars have been timed and that of this number only about sixty-five were exceeding the speed limit, and not one of these sixty-five cars has had to be warned a second time. By observation here it has been found that the colder the weather the faster the cars are driven, reaching the maximum average limit at the end of the season when the snow is on the ground. This is accounted for by the fact that the cold weather causes a feeling of exhilaration which offsets any fear a driver may normally possess. Again the time for the use of automobiles for pleasure is over and the cars that are being operated are for business purposes or else for rapid means of travel between suburban homes and the city.

Although several different plans for timing the cars had been tried, it was not until the telephone was employed that accurate results could be obtained. Besides the obvious advantages the telephone possesses for instantaneous communication its signal bell is the determining factor in the timing process. The moment a car passes the first observation station the operator rings the bell. This signal is received simultaneously at the timing station, and consequently the timekeeper is enabled to place his stop watch in operation immediately. Whilst the car is traveling between the two points the calling operator is enabled to give the timing station the information relative to its number and registry, together with the direction in which it is going, so that the men on duty at this point may be on the lookout. Then, before the car can pass the third observation point, if it has exceeded the speed limit, the policeman on duty there can be instructed to make the arrest. As he has been furnished the correct number, there can be no mistakes.

In the system described neither station is in sight of the others. It is installed on a portion of roadway much traveled by automobilists and is situated at a point where there are no cross roads which would tend to cause the chauffeurs to slow up their cars. Hence it is admirably placed for a demonstration of the practicability of the plan. The telephones employed are ordinary bridging instruments on a private line with local battery. Each is given a distinct call number. Station No. 1 is signaled by one ring, Station No. 2 by two rings, while three rings calls Station No. 3. The rings for Stations 2 and 3 are arbitrary, but the call for Station 1 is made a single ring to save time in calling, as it is the timing station. Placing the timing station in the centre gives it supervision of the measured blocks in both directons and enables the timing to be done at one point. So far this plan of timing automobiles has proved very satisfactory. Its object has been not so much to gain evidence for arrests, but rather to prevent the unnecessary scorching through its moral effect. At present several other installations are under consideration and one under construction is rapidly nearing completion. This timing system is under the direct charge of the Traffic Squad, the head of which is Sergeant McCullagh. The maintenance of the telephones is under the direction of the Police Signaling Department, the chief of which is Mr. Brennan.

Illustrations for this article are from "Harper's Weekly," copyright 1905 by Harper & Bros.

POLE INTERFERING WITH WATER PIPE.

THE injunction of George I. Wilson against the Chesapeake and Potomac Telephone Company has been dissolved by Judge James McSherry, counsel for Mr. Wilson, the telephone company and the mayor and aldermen of Frederick having arrived at an amicable adjustment of the differences existing. The injunction grew out of the removal of a telephone pole on the property of Mr. Wilson about 18 inches from the curb line, which Mr. Wilson claimed interfered with the water pipe running into the house. The pole, which was in the hole, has been cut off and another pole placed on the west side of the old one, about 18 inches inside of the curb line.

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Telephone Investments—and Others*

By Frederick S. Dickson.

THE Cuyahoga Telephone Company owns the Electric Building on Prospect street in which its central plant is installed. The land was wisely bought and the building wisely planned and built. Its cost was $450,000. Its present value is probably over $600,000 and its near prospective value not less than $750,000.

We have in the streets of Cleveland 141,800 lineal feet of subway containing 1,610,600 feet of vitrified tile conduits. This would cost $275,000 to-day to build and its intrinsic value is more than cost. Its length equals 306.59 miles, enough to reach from Buffalo to Toledo and yet have 10.59 miles to spare. Or, it would reach from Cleveland to within fifty miles of the city of Chicago. If laid beside the Lake Shore tracks, the Twentieth Century limited, traveling on its new schedule, would take five hours, forty-seven minutes and forty-nine and one-half seconds to pass from one end to the other of the Cuyahoga Telephone Company's underground conduits.

The great fire in Baltimore in 1904 consumed so-called fireproof buildings as if they were tinder. What effect did it have on the underground conduits? Mr. Charles E. Phelps, Jr., Chief Engineer of the Electrical Commission of Baltimore, reported on this matter as follows:

"A careful scrutiny fails to reveal the slightest damage to any structural part of the trunk conduits, including manholes, despite the intense heat and the enormous weights of masonry and iron that fell on them, the debris in some places being heaped upon them to the height of ten feet. In some cases the conduits were only nineteen inches below the ground level with service connections every sixty or seventy feet, and although the iron, stone and brick fell from considerable heights, the great burning masses heating the ground to a temperature sufficient to melt the pavement, still the 13,000 volt circuits were not interrupted by any damage to its conduit system."

Such a fire would have destroyed every fireproof building in Cleveland, but would have left unharmed the conduit system of the Cuyahoga Telephone Company.

The switchboard at the central exchange of the Cuyahoga Telephone Company is one of the largest in operation. Its ultimate capacity will be sufficient to serve 18,000 main line telephones. This switch alone contains over 1,275 miles of copper wire, enough to reach from Cleveland to Denver, Colorado.

Outside of the switch we have a total of 54,731.36 miles of copper wire, which would cost to-day $684,735.75. This wire would girdle the earth twice over and leave enough for a line from New York to San Francisco, and still another from Cleveland to the City of Mexico.

The Cleveland Electric Railway Company has 240 miles of track and its rails weigh ninety-five pounds to the yard, or 167.2 tons to the mile. These rails cost $38 a ton and a mile of track would, therefore, cost $6,353.60. So the money invested in copper wire by the Cuyahoga Telephone Company would buy enough rails to lay over 107¾ miles of track, equivalent to nearly forty-five per cent. of the entire system of the Cleveland Electric Railway Company. The value of the underground conduits would pay for forty-three miles more of track, making a total of sixty-two and one-half per cent. of the entire system.

And yet unthinking investors claim that a telephone company has no valuable assets! Cannot people realize the retiring disposition of the telephone company? It burrows underground when it can, or modestly makes its way along the alleys or back streets, keeping its ugliness out of sight when it may. Do investors insist that they will not recognize the value of a property unless manifested by unceasing noise, showers of soot or a bad smell?

2. *Are Values Likely to Increase or Decrease?* This is after all the most important of all considerations. A business at a standstill is not worth having, unless it can be made to advance. A decreasing business is already dead.

All public service corporations are vitally interested in the growth of the region which they serve. If a town grows rapidly in any direction rails are laid, pipes extended or wires strung in that direction. If population decreases in a section fewer cars are run there. It does not pay to remove rails or pipes, perhaps, but it is easy to take down wires where they are not needed and put them where they can earn money. Here is another manifest advantage which the telephone company has over its fellows: A large portion of its property may be economically shifted to meet varying public needs.

According to the reports of the Bell people, they had in 1882 a total of only 118,862 telephones in the United States. In 1896 there were 386,313, a growth of only 267,451, or 225 per cent. in fourteen years. In 1904 the Bell people claimed a total of 1,800,000 telephones, that is a growth of 1,413,687, or 365 per cent. in *eight* years. Competition made the difference. Bell calls these stations, not telephones. When it reports telephones it doubles its figures. This is a heritage from the days of patent monopoly. Then it called both the receiver and transmitter a telephone, and so excused the exaction of two royalties instead of one.

In the meantime patents having expired, opposition, or Independent, plants began to be built, and to-day the number of Independent telephones in the United States slightly exceeds the Bell figures. In Ohio the Independents have 670 exchanges and the Bell people 157. There are 1,452 Independent toll stations as against 753 Bell, and there are 196,617 Independent telephones in the State and only 104,379 Bell. The Independents claim to have 17,029 stockholders interested in their properties and the Bell about 400, nearly all of the latter being in Cincinnati.

For the accuracy of these figures we cannot vouch. As far as the records of the Independent plants are concerned, our returns are very nearly correct, but the Bell company does not take the public into its confidence and publish its records. It claims round numbers, and the impression it leaves is that its claims are in excess of the facts. For instance, the Cuyahoga book which went to the printer November 30, 1904, had 12,194 names, and on that date the Cuyahoga had 13,711 telephones, a little more than 1.12 telephones to each name. The book of April 30, 1905, had 14,732 names, and on that date the Cuyahoga had 16,501 telephones, or a little less than 1.12 telephones to each name. On December 31, 1904, Bell's book had 14,442 names, and on that date they actually had 18,688 telephones, or a little less than 1.3 telephones to a name. The larger proportion of Bell telephones to a name is due largely to the instruments installed in the rooms of the hotels. There are 750 telephones in hotel rooms with only three names. On March 31 the Bell book showed 15,418 names, and at the rate of 1.3 telephones to a name this would indicate a total of 20,043 telephones. The actual total is undoubtedly somewhat less than this as no new hotels have been wired, and more people are now taking a single telephone than adding to the number they have. Yet at this time the Bell people were claiming that they had "23,000 telephones," or "more than 22,000," as their literary bureau fancied. It is this which makes comparisons so difficult. Cuyahoga tells what it has, and Bell what it hasn't.

We have told you that in 1896 the Bell people claimed only a total of 275,000 telephones in the United States. This was about the time the patents expired and before competition forced them into an unwilling development. In those days the Cleveland Telephone Company (the Bell) had a total of only 4,200 telephones and they persistently discouraged spreading into the outlying residence districts by charging very high rates for such service. Competition changed all that and the Bell people were

(*Continued on page 329.*)

*Fourth article from Mr. Dickson's book.

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The Simplification of Circuits*

By Frederick T. Johnson.

IN this line of development the next step is to show a method of removing the subscriber's line signal from a circuit after a connection is established. This is desirable even with the magneto system, as otherwise two line drops and a clearing out drop, as referred to in the following paragraph, would be bridged across the connected lines. Even though the impedance, or effective resistance, of each drop to talking currents is fairly

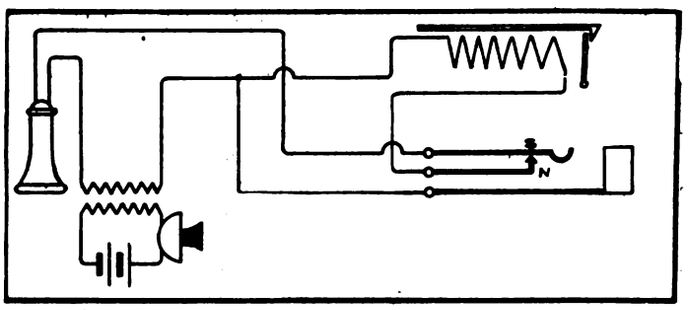

Fig. 4. Subscriber's line circuit with magneto drop wired to cut-off jack.

high, the shunt path formed by the three in multiple would cause a division of current which would produce a noticeable loss in the volume of sound in the receiver. In Fig. 4 is shown a diagram of a circuit in which one side of the drop is wired to a stud N, which is normally in contact with the line spring S of the jack. The insertion of a plug into the jack forces the line spring away from the stud and disconnects the drop.

In Fig. 5 is shown a complete circuit for two subscribers' lines using the magneto system for calling. In one station, for completeness, the generator is shown; in the cord circuit will be noticed a new feature, the clearing out drop R. This piece of apparatus has two important uses. In the first place, if a subscriber should have been given the wrong number, or for any other reason wish to call the operator after the connection is put up, the fact that his line signal has been disconnected will make it impossible for him to attract the operator's attention in the same way that he could before his call had been answered. The called party also might wish to speak to the operator, and his line signal could not be operated until the connection had been taken down. The bridging of a drop across each cord circuit provides a signal which can be operated by the subscribers at either end of the connection. In addition to the uses mentioned above, it is used to notify the operator that the conversation has been completed. The operator knows this to be the case when on cutting in on the circuit with a challenge she receives

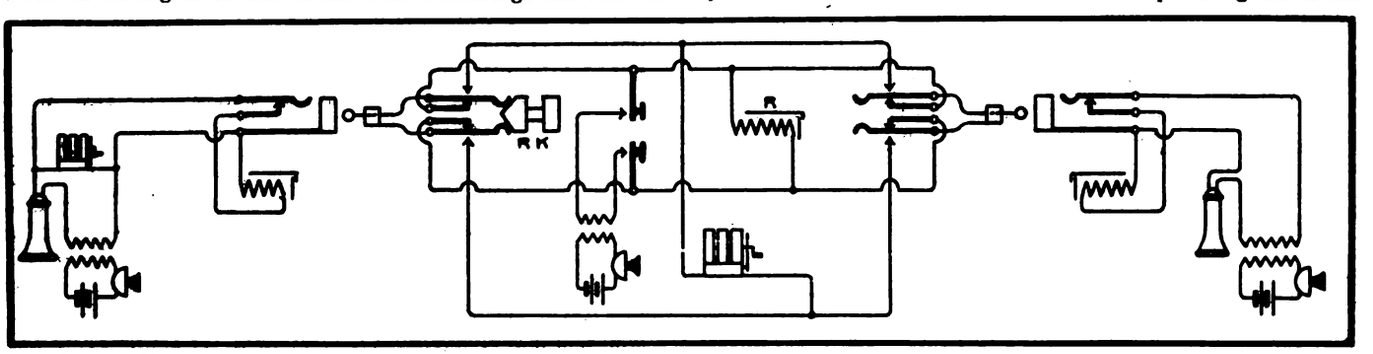

Fig. 5. Simplified circuit for two magneto telephones connected through central office, showing elements of exchange circuits.

no reply. The cords are then taken down. This use of the clearing out drop enables the operator to avoid encumbering her switchboard with idle cords, and to determine when connections are ready to be taken down without repeatedly annoying subscribers by breaking in on the circuit.

*Continued from Nov. 4th.

With the introduction of the common battery system there were made necessary certain changes in the methods of bringing about results. As there was no change in the general method of

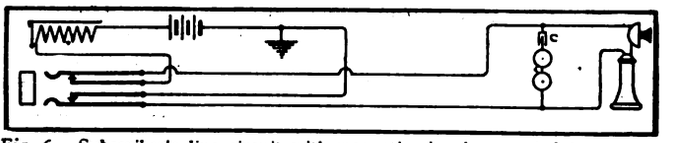

Fig. 6. Subscriber's line circuit with magnetic signal connected to common central office battery.

handling business, the duties to be performed by the apparatus remained practically the same. The changes were made to permit of the use of a single battery, located at the central office, for supplying current to the primary circuits of all telephones and to control the signals at the exchange. Fig. 6 shows a subscriber's line circuit in which is brought out the method of connecting to the central office jack a magnetic signal, similar in general principle to the magneto drop. This is operated by the closing of the circuit through the hook switch at the subscriber's telephone, which makes a complete circuit, as shown, through the battery, line, telephone and signal. The disconnection of this line signal during conversation is brought about by the use of a cut-off jack, as with the magneto system. In addition to the signal itself the battery is disconnected by the use of a contact stud on

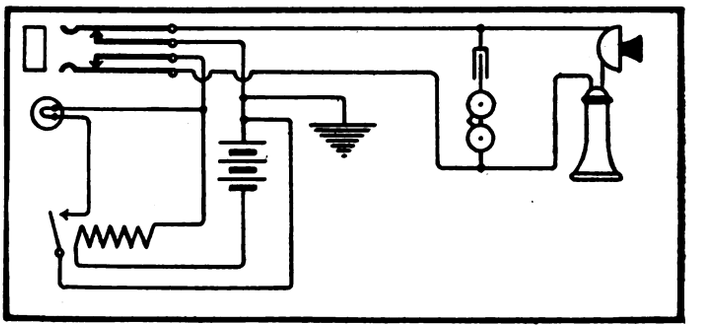

Fig. 7. Common battery line circuit showing signalling lamp on local circuit.

the other side of the jack. This is done to avoid a connection to the battery ground on one side of the line, which would produce a noisy line. It will be noted in this circuit that the necessity for the generator at the subscriber's telephone has disappeared, and none is installed.

An additional step in the application of the common battery system was made in the introduction of lamps as signals in the central office. This invention made possible a saving of space in front of the operator, which enabled her to have more lines brought within her reach. Moreover, the length of time necessary to answer each call was reduced by placing the lamp directly above or below the jack with which it was associated, so that it was not necessary to note the number of the signal in one part of the board and then plug into a jack located in a different part,

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but bearing the same number. In Fig. 7 it is evident that the general method of signaling is the same as in Fig. 6. Instead of a simple magnetic signal across the line, however, a relay is used, and the operation of this relay completes a second circuit through its armature and the associated contact, which allows the battery current to pass through the lamp and light it. The new element of a signal operated on a circuit confined strictly to the exchange is here shown for the first time.

(To be continued.)

INTEREST IN INDEPENDENT MOVEMENT IN DETROIT SPREADS THROUGHOUT THE STATE.

THIRTY-TWO gentlemen, most of them from places in Michigan outside of Detroit, met in that city, on Oct. 31, in the interests of the Independent telephone companies of the State. A greater portion of the day was spent in discussion of the situation and especially the opposition to the introduction of another telephone system in Detroit by the directors of the Board of Commerce. A committee consisting of T. E. Barkworth, Jackson; C. H. Rauch, Plymouth; O. J. Parker, Howell; Tod Kincaid, Owosso; A. A. Nichols, Lansing; J. H. Whitney, Merrill; M. A. Porter, Northville, and J. B. Ware, Grand Rapids, was appointed to draft a set of resolutions setting forth the situation as viewed by the Independents. This committee framed a statement which covered the essential points under discussion substantially as follows:

"We find that over $6,000,000 has been invested by more than 8,000 citizens of our State in a successful effort, through Independent exchanges, to secure good telephone service at reasonable rates, which they could not otherwise have enjoyed.

We believe that this sum, in comparison with less than $200,000 of the stock of the Bell company, owned by 80 individuals in Michigan, as shown by its last report to the State, imposes upon every citizen the duty of an honest effort to conserve the interest thus created by the many.

We believe the 76,000 Independent telephones existing in the southern peninsula of Michigan to be more valuable to the commercial interests of the city of Detroit than the less than 40,000 Bell telephones in said territory outside of said city.

The Independent interests have been uniformly successful in the State and the movement has resulted in the securing of good service at reasonable rates and the obtaining by a very large number of citizens of the advantages of modern service, which otherwise they could not have enjoyed.

We therefore request the citizens of Detroit to withhold their final judgment regarding the advisability of an Independent telephone system until further information and data shall be presented for consideration by the Independent interests of the State.

While we believe that there is abundant capital in the city of Detroit to construct and maintain an Independent service, we urge, if such capital is not now available, that outside capital ready for such service be not given a hostile reception; and that obstacles thrown in the way of its activity are injurious to the public welfare and particularly to the commercial interests of the city of Detroit."

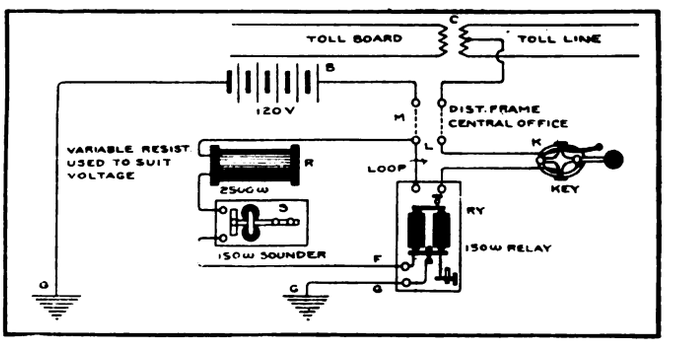
This report was unanimously adopted by the convention.

COMBINATION LINE AND LOCAL TELEGRAPH CIRCUIT.

By Louis Muhlheizler.

IN connection with the operation of telegraph instruments over telephone lines, by the arrangement commonly known as a simplex circuit, the following scheme has been devised for working the telegraph sounder by means of the main line battery. The illustration shows a repeating coil at the central office, one winding of which is connected to the toll line, and the other winding to the switchboard. The dotted lines M show the central office distributing frame. L is a loop to subscriber's telegraph station. B is the storage battery at the central office. One side of the loop from the telegraph subscriber's station is connected to the center of the repeating coil winding marked toll line, and thence passes through the key marked K to the 150 w relay marked R and, as the other side of the loop, is carried back to the central office distributing frame. Here it is cross wired to the positive side of the battery B, which has the negative side grounded at G. At the telegraph station is provided a variable resistance coil marked R. One side of this coil is connected to the battery side of the telegraph loop, and the other side goes through the 150 ohm sounder, S, and thence to the local contact of the relay marked F, from which a connection to ground through the armature G^1 completes the local circuit for operating the sounder.

The variable resistance is to be used to adjust the current through the sounder. For instance, if only 20 volts were to be used, the resistance would only need to be 500 ohms; for every



Circuit for Operating Telegraph Sounder from Exchange Battery.

increase of 20 volts in the battery pressure add 500 ohms until the limits of 120 volts and 2,500 ohms respectively are reached.

The advantage presented by the use of this circuit is, that all of the current for operating the complete telegraph circuit is supplied from the central office. This does away entirely with the use of batteries at the station, with the consequent annoyance and expense involved in their maintenance, and results in a saving of space which is appreciated by the subscriber. The only difficulties to which the circuit is subject, as shown during about a year's practical operation, have been that it is necessary to occasionally adjust the sounder, and also the variable resistance, from time to time, as conditions on the line become altered.

WELL ATTENDED MEETING HELD BY SEVENTH INDIANA DISTRICT ASSOCIATION.

FIFTY-TWO of the sixty Independent companies that compose the Seventh Indiana District Association were represented at a meeting in Indianapolis, October 11. This district, which is one of eleven into which the State is divided by the Independents, comprises the counties of Boone, Hamilton, Hancock, Hendricks, Johnson, Marion, Morgan and Shelby. The meeting was held in the office of C. S. Norton, assistant secretary of the New Long Distance Company, who has been taking a prominent part in association work in all parts of the State. W. W. Mendenhall, president of the district, presided. H. B. Sale, general manager of the New Long Distance Co., welcomed the delegates, who said that $15,000,000 was invested by the Independents in the State, making one of the State's greatest commercial factors. His own company owned about one-half the toll lines in the State. He suggested that the weak members of the organization be strengthened. Mr. Norton, secretary of the Independent Telephone Association of Indiana, outlined its plans and purposes. Representatives of the companies in the district nearly all signed the constitution and by-laws and others agreed to do so as soon as their directors could be brought together. Reports were made by all delegates as to conditions in the district.

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QUERIES

SPLICING A SUBMARINE CABLE.—(621.)

Will you please give me the method of splicing a submarine cable? C. S.

SUBMARINE cables vary to a certain extent in the details of their make-up, but the essential ideas are contained in the following description, which can be modified to fit the particular type you have at hand. The first step is to prepare the cable ends which are to be spliced. About three feet back from each end should be wound several turns of marlin, or preferably, galvanized iron wire. This wrapping must be so tight that after it is in place no amount of turning or twisting of the cable end will displace the armor wires beyond the lashing. After this has been done the ends of armor wires should be unwound, straightened, bent back over the lashing and tied to the cable with a loose wrapping of marlin to hold them out of the way. Next unwind (never cut) the jute covering, or coverings, and lay these back and fasten in the same way as armor wires. The cable ends are now ready to be brought together.

Lash the prepared ends firmly to a rigid support, with their centre axes in a straight line. The support should be so arranged and located as to allow the splicers access to the cable from any direction. The proper distance apart for the ends, measuring from the armor lashings, will vary with the number of conductors from 15 inches for three pairs to two feet for fifteen pairs or more. It is necessary to have the support securely fastened, in order that the cable shall not be moved in the slightest degree after splicing is started.

After the ends are in place the conductors may be separated

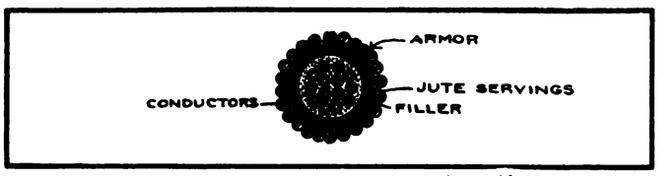

Fig. 62a. Sectional view of submarine cable.

and spliced in much the same manner as those in a paper cable. Stagger the splices and remove the insulation, leaving about ¾ inch to make a regular twisted line joint. Before twisting clean the conductor carefully with emery cloth. If the cable has stranded conductors each strand should be separately cleaned, heavily coated with solder and retwisted into the strand before making the joint. No holes permitting the insulating compound to act directly on the copper should be left. After the joints have been made they should be soldered with the utmost care. Poor soldering is a very frequent source of trouble in submarine splices.

The next step is to thoroughly insulate the connection. Apply heat to the conductor joint until the rubber insulation at each end becomes soft, then apply heated Chatterton compound or other approved insulator, building it around the joint until it has the same size as the regular insulation at its junction therewith, and is a little thicker in the centre. While it is still hot shape it around the splice, and be sure that at each end it forms a good union with the rubber insulation. Alcohol on the fingers will keep the compound from sticking to them. Look the compound over carefully and be sure that the complete insulation is smooth and solid with no flaws nor seams at the joint or elsewhere. If a substitute for "Chatterton" compound is used it should be a substance which is a good insulator, will adhere to the tinned wires, form good union with rubber, harden firmly but not crack easily, and not act injuriously on conductors nor insulation.

The outside insulation of the splice is the object of the next process. Heat a sheet of gutta percha until it becomes soft, and wrap it about the cable over the joints, which must previously have been formed into a round, compact mass. The joint should be completely covered, and the covering extended back over the regular insulation at each end. This layer in turn should be carefully examined, and no holes, cracks nor seams left unrepaired. Next wind a layer of best quality rubber tape over the splice, after it has become thoroughly cold. No ~~rubber~~ filled tape should be used.

After the conductors have been spliced and insulated as above described the jute strands that have been used for filling pur-

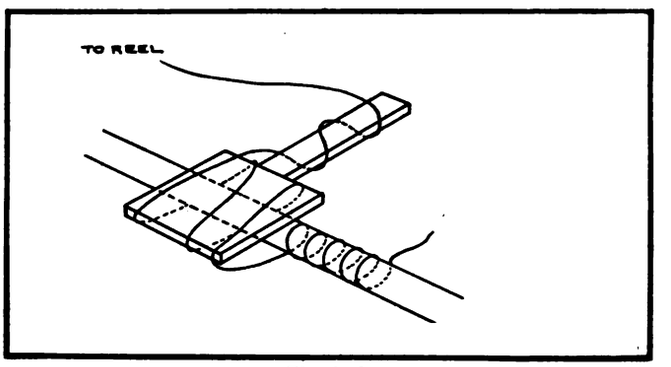

Fig. 62b.

poses shall be laid back in their proper places, cutting them off to the proper lengths, and bound with one or two layers of carefully wound rubber tape. Over this tape the jute servings shall be wound as evenly as possible, and over these should be laid two servings of marlin. These servings must be tight. The necessary tension on the marlin can be obtained by the use of a serving board, as shown in Fig. 62*b*.

The next operation to be taken up is the splicing of the armor. The wires must be bent back and laid along the cable, first one from the left hand end, then one from the right, and in this order for the remaining wires, around the cable. These armor wires must be held in place by an extremely firm, tight, spiral winding of strong galvanized iron wire. The use of a serving iron, Fig. 62*c*, will enable the workman to wrap the wire tightly about the splice. Take a coil of

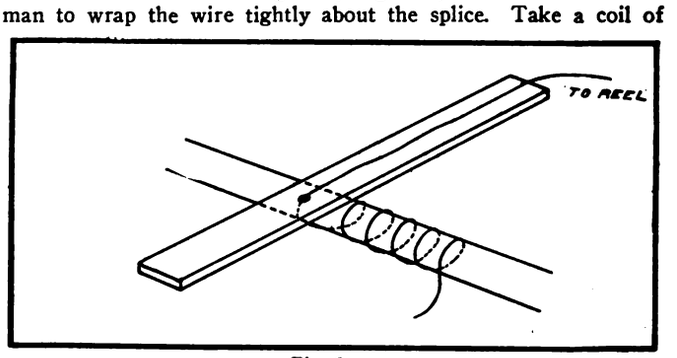

Fig. 62c.

No. 10 galvanized iron wire, pass half of it through the hole in the iron, then lay the iron against the splice, and, starting in the centre of the splice, wind the wire toward the cable at one end, bringing out the armor wires from the cable end away from which you are working at suitable intervals, bend them over sharply and cut them off, leaving the ends long enough to clutch firmly over the spirally wound wire, and hammer them down solidly against it. Fasten this serving wire to the last armor wire close to the end wrapping, then wind the other half of the coil about the other end of the splice in a similar manner. If the original cable has an outer covering of jute, a double winding of marlin may be laid over the armor at the splice.

It is most essential in making a splice in a submarine cable

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that all materials should be of the very highest quality, and workmanship of the best order. The cable should be carefully tested, and any defect discovered and remedied before the cable is placed. Any defects arising from an endeavor to save expenses in the operation of splicing are likely to bring on troubles, which can only be remedied at an excessive cost. A submarine ordinarily receives very rough usage, and when laid can be repaired only with the utmost difficulty.

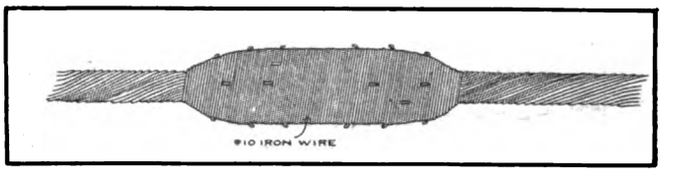

Fig. 621d. Completed armor splice.

Telephone Investments—and Others

(Continued from page 325.)

forced to extend their service and reduce their rates. Let us try if we can to understand this question of increase of business and its natural effect upon rates.

The cost of supplying telephone service increases as the use increases. This at first sight looks like an exception to the usual rule of business, but it is perfectly logical. The telephone company does not actually charge anything for your telephone, but for the telephones to which you have access. Your telephone is worthless without the others. A company might give 5,000 connections for $48 a year and make money, but they would lose money if they attempted to give 20,000 for the same price. The Bell Company, before competition, everywhere and always charged all it could get for its service and developed as little as possible away from the business centers. The Cuyahoga Telephone Company started at reduced rates because it was clear that service could be given to 5,000 people for much less than the Bell Company was charging, but when the system grew to 15,000 telephones, rates had to advance. A street car company could not carry two people for the price of one, neither can the telephone company either double or quadruple its service and yet maintain its old prices. Remember it is service the company has to sell, not telephones. You would not expect to move to New York and still pay Cleveland rents. You know you would have to pay more for your house, your office or your place of business, and you would be willing to do so because you would get more for your money; could do more business; make more money. So it will be as Cleveland becomes more like New York. The larger your city grows the more will all values advance. The bigger your telephone company becomes the greater is its value to you. You are ready to pay more for anything when you get more of everything.

Los Angeles, California, had a population of 102,479 in 1900. It had on January 1, 1905, about 144,000 people and 18,000 telephones. That is one telephone for eight people. Cleveland had 381,768 inhabitants in 1900 and it had on January 1, 1905, about 455,000. On the same date the Bell Company had 18,688 telephones and the Cuyahoga had 14,307, a total of 33,095 in both systems. This was one telephone to about fourteen inhabitants. If the telephone business here were developed as thoroughly as that of Los Angeles it would require 56,875 telephones. These figures, however, do not show the whole truth, as the business of both companies extends far beyond the limits of the city and, therefore, serves a much larger population than we have figured. But, on the other hand, the character of the population in these two cities differs materially. Los Angeles, composed largely of well-to-do people, will naturally use a much larger percentage of telephones than Cleveland with its huge labor population. It seems clear though that there is still room for natural development, and that within a brief time there will be not less than 50,000 telephones used in Cleveland. It is equally clear that the new business will naturally go to the company giving the best return for the money, the best service and the lowest rates.

From all these figures, from all the information we can get, from what everyone can see going on day by day, it is clear that the general use of the telephone is increasing. People who once did without it, now want it. Those who once test its use will not give it up. Those who used it some now use it more, and therefore need more telephones. Business places extend their lines into other rooms because it saves money and time to do so. In residences extensions are run to the second floor, for it is as necessary to save your wife's footsteps as your own.

3. *Is Competition Likely to Destroy Values?* Competition may be of two kinds: (1) Some other company may do the work better or for less money, or (2) some other process may be devised which would destroy all values. The Cuyahoga Telephone Company to-day has as good a plant as mechanical skill can devise and in addition this company has a well organized force of capable employes. With good machinery, competent workers and the right spirit of work why need competition of this kind be feared? It stimulates rather than injures. It is *not* feared. The first aim of this company is to give the best possible service, and only after that is done do we consider how interest and dividends are to be paid. But will not this policy insure the payment of interest and dividends?

Is it likely that some other process of transmitting the voice would destroy the value of this plant? When the electric light first appeared the owners of gas stocks were panic-stricken. Millions of dollars are expended to-day in producing electric light and yet gas properties earn more money than ever. The result has been that there is more light in the world. That is all.

When the suburban trolley lines began operating, steam railroads feared the competition and resisted such enterprises in every way possible. And yet the steam railroads have gained rather than lost by the apparent competition. With increased facilities people travel more. That is all.

Millions of messages are sent over wires to-day and yet as many letters as ever go by mail. The telephone has made it possible for men to do more, not merely to do the same in less time. When something is invented that is quicker than talking the telephone may go to the ash heap, but not before.

Competition in telephony has benefited the public and it ought also to benefit the companies, or at least one of them. The greatest benefit, maybe all the benefit, will inure to the company who does its work best. The Bell Company can give telephone connection with New York and Chicago and the Cuyahoga Telephone Company to-day cannot. This is an advantage to the Bell Company, but 98 per cent. of all telephoning is local. Of long distance telephoning 98 per cent. is to points within a radius of one hundred miles. Beyond that distance it becomes too expensive, excepting for special requirements, and the telegraph is used. The Bell Company has an average of fifteen calls a day between Cleveland and New York, about eight sent and seven received. The same company has about forty calls a day between Cleveland and Chicago, about as many sent as received. For want of connections with New York and Chicago, the Cuyahoga Telephone Company now loses that business. But the Cuyahoga Telephone Company has an average of eighty-seven calls a day between Cleveland and Lorain, about forty sent and forty-seven received. For want of an exchange in Lorain the Bell Company now loses that business. And there are scores of towns in Ohio where like conditions exist.

Mr. Addison Hough, of the Cleveland brokerage firm of Otis & Hough, states that four out of five long distance calls in his office come over the Cuyahoga telephone. "How about New York?" he was asked. "We never use the telephone to New York. We use our private telegraph wires. Telephoning that distance is too expensive." Nearby development, nearby connections, nearby towns are of greater value.

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THE TELEPHONE IN THE COURTS

CONDUCTED BY A. H. McMILLAN.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

DESIGNATION OF STREETS IN WHICH POLES ARE TO BE PLACED.

Is there a statute in New Jersey making it the duty of a city to grant a franchise to a telephone company on application? P. A.

REVISION, p. 1174, of New Jersey laws, provides that no posts or poles shall be erected in the streets of an incorporated city or town without first obtaining from such city or town a designation of the streets in which they shall be placed. The supplement to the above statute (P. L. 1880, p. 201) makes it the duty of the authorities of such city or town to make the designation on application. The permission here referred to is not technically a franchise. You obtain your franchise from the State when you incorporate, and, when that is done, you are in position to compel the city authorities to designate the streets you are to occupy. Mandamus is the remedy.

PRECISE PLACE NEED NOT BE DESIGNATED.

Under the New Jersey laws does the city council have to specify the precise place in the street where each pole is to be located? M. G.

NOT at all; it is sufficient if the council designates the street itself. Marshall v. City of Bayonne, 59 N. J. L. 101, 34 A. 1080.

REGULATION OF WIRES AS AN IMPAIRMENT OF CONTRACT OBLIGATIONS.

Is not the action of our state legislature in establishing new regulations for the wires of a telephone company in the streets of a city after the company has been doing business there ten years an impairment of the obligation of contract, and as such, unconstitutional? Remember that when we invested our capital these new restrictions were not in force, but are enacted later and compel us to either make a much heavier investment than we can afford or go out of business. C. L.

UNDER the general police power of the State, the Legislature has wide latitude in the regulations it may establish.

A company which has obtained permission from a city council to occupy the streets on certain conditions is still subject to subsequent regulations prescribed by the Legislature, not amounting to an impairment of its substantial rights. The question of whether the new regulations amount to an impairment of your substantial rights depends on whether the regulations are for the protection of the public and tend to the peace, good order, health, comfort and welfare of society, or whether they are merely arbitrary and whimsical enactments, with no such reasonable purpose in view. See People v. Squire, 145 U. S. 175.

SUIT FOR DAMAGES FROM CHANGE OF NUMBER.

THE alleged changing of a telephone number is the cause of a suit for $100,000 damages in the Allegheny county courts. Loss of business and a claim that others reaped the benefit from an original telephone call are given as the principal causes for recovery.

Esther Crawford, trading as the E. Crawford Sawmill Company, and John E. Crawford, her husband, have filed statements in suits against the S. B. Evans Lumber Company and the Central District & Printing Telegraph Company. The plaintiff demands $50,000 from each. In the suit against the defendant lumber company business relations existing between the plaintiff and the Evans company are included in the allegations.

It is alleged that the telephone company installed a telephone for the plaintiff known as 288 South, which was afterwards changed to 288 Hemlock. It is further claimed that it was not a party line and was, it is alleged by Crawford, the principal advertisement of his firm among his business acquaintances and his friends.

In the complaint against the telephone company, the statement is made, that in violation of its agreement with D. B. Evans, or the D. B. Evans Lumber Company, without notice to or knowledge or consent of the plaintiffs, the Evans Company was also placed on the list of telephone subscribers as having its number 288 Hemlock.

This, it is alleged, deprived the plaintiffs of their advertisement and enabled the Evans Company, it is argued, to impose on the plaintiffs and persons with whom they did business, by representing to them that the plaintiffs had gone out of business. Prior to this alleged arrangement it is charged that their business amounted to from $8,000 to $12,000 annually. After the alleged giving of the telephone number to the Evans Company, the business fell off until they are doing no business at the present time.

INJURIES RESULTING FROM EXCAVATION IN STREET.

THE Southern Bell Telephone & Telegraph Company dug a ditch in the streets of Atlanta, Ga., for the purpose of laying its wires and conduits. One Lulu Kent was about to step across the ditch at a street crossing when the dirt embankment gave way and fell in, inflicting some injuries upon her. In a suit by her against the telephone company the court held that, if she had fallen into the ditch by a misstep, she would have been held to have assumed the risk of attemping to cross such a visible obstruction as a ditch, but it not being apparent that the ditch would cave in, she could not be held guilty of contributory negligence and that a cause of action was set up in her petition. Kent v. Southern Bell Telephone & Telegraph Co., 48 S. E. 399.

SUIT TO SECURE A FRANCHISE.

THE Northwestern Telephone Exchange Company, of Minneapolis, has commenced suit against the city of St. Charles, Minn., in the Federal courts. The Exchange Company, it is said, desires to operate a local exchange in St. Charles, and had made application for permission to install the same, which has been refused by the city. The Exchange now has a public pay station in the city.

ORDINANCE AND ESTOPPEL.

JUDGE C. D. CLARK, of the United States District Court, at Nashville, Tenn., has handed down a decision in the case of the City of Nashville v. the Cumberland Telephone and Telegraph Company, the opinion upholding the defendant's contention. There is an ordinance on the statute books of the city relieving the Cumberland Company of all except water tax on the payment of a tax of $1 on each telephone box in actual use. Recently the city tried to collect an ad valorem tax on the property of the company on the ground that the box tax was only in lieu of privilege tax. The Cumberland Company resisted payment, carried the matter to the Federal Court, and that tribunal declares that the city is estopped by its own ordinance from collecting anything more than the box tax.

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THE EDITOR'S PAGE

THE OHIO TOLL LINE MAP.

THE recently published map of the Independent lines in Ohio is sufficiently complete to thoroughly confirm our belief in the value of the plan. To the operating man it shows in the clearest manner the connections which can be made from his own exchange; routes for messages can be more intelligently developed; money expended on line construction can be put where it will provide for future long distance business. Such a map can be well employed in gaining new business. Merchants may need a vigorous shock to start them into a new method of conducting affairs, but the possibility of instantaneous communication over direct lines must appeal to all. There is nothing like a map for conveying the argument completely and quickly.

Finally, the general effect on the attitude of the public toward the development of Independent telephony must be improved. The present confidence will be greatly strengthened by the full knowledge of the extent of the system. The prospective subscriber or investor will not have to take the word of any man; will not have to experiment; he can see for himself.

HOTEL GROWTH IN LARGE CITIES.

AN interesting phase of telephone development is found in the large hotels erected in New York City or other large cities in the United States. Europe, as well, is not exempt in this reference to those causes which gave rise to their gigantic construction.

Skyscraping office buildings are one of our accepted characteristics, but of late the tendency in this direction has been closely followed by the builders of hotels. These structures are rising on all sides like tall cliffs above the surrounding city landscape. They are notable in many respects, from an engineering, architectural or artistic standpoint, but among their chief features may be noted, first, the elevators by means of which the patrons ascend to the skies, and, second, the telephone by means of which, when once there, they can send their orders below. It is hardly within the scope of these pages to expatiate upon the conditions which exist in a skyscraping hotel if by any accident means of communication between the clerk's office and the patrons were to be destroyed.

The situation as it now presents itself is one in which, the taller and larger the hotel becomes, the more completely is it dominated by the application of electricity. This domination appears in the field of signaling and speaking. All large, modern hotels are equipped with a perfected telephone system in conjunction with the signaling devices required by custom. In fact, the influence of this idea upon hotel development is one of the most remarkable in the history of such institutions. The elevator, as already stated, is now the prominent feature as far as architectural development upward is concerned. But public opinion has attached itself to the telephone as the source and means by which its comfort when so domiciled is doubly assured. The skyscrapers are therefore, in a sense, the secondary consequences of other than purely architectural possibilities. In fact, it would not be difficult to prove that the subtraction of the telephone and elevator from such structures would rapidly lead to their failure as hotels. It would not be stretching the truth too far to say that, as an architectural creation, the fifteen or twenty-story hotel would never have existed if it were not for the means by which every room in the building is placed in close juxtaposition to the clerk's office. The same could readily be said of skyscraping apartment houses, or office buildings, but it is particularly true of the hotels of the present epoch, as far as the cosmopolitan cities of the United States are concerned. Thus then evidence has been presented showing the interrelationship existing between the introduction of an innovation like the telephone and its after effects upon the architectural appearance of a great city.

On the other hand, finding a use for the telephone means finding more room for the activities of those engaged in the trades or professions associated with it. The building operations in all large cities to-day are in a measure the signs of the extent to which telephones have mastered the situation. In London the office buildings and hotels are only introducing elevators and telephones. Visitors say the buildings are squat in comparison with our own. A visitor to New York twenty years ago would have seen little difference in this respect architecturally. Noting the present differences seems to lead to the conclusion that the telephone has actually influenced modern architectural conceptions, in so far, at least, as the tall building is concerned. However good the elevator, without the telephone system the greatest annoyances would result. Tall hotels are simply instances in which more rooms and more conveniences are secured by the proprietors, largely due to the accepted service of the telephone.

TELEPHONE ELOCUTION.

WE have already made reference to the necessity for clear enunciation in speaking into a telephone transmitter, and take this opportunity of touching again upon the subject. The reason why a consideration of this is necessary is because the various vocal sounds produce varying degrees of current strength. For instance, when E is pronounced the current flowing is not nearly as large as that produced by A. The sounding of A means greater pressure against the carbon element of transmitter and a correspondingly greater volume of current flows through the primary of the induction coil. On the other hand, when E is pronounced in comparison with O, it will be found that this last letter also causes a greater aerial impact against the diaphragm than when E is sounded.

The principle underlying this proposition is, therefore, as simple as it is interesting. Those sounds which cause a more violent blow against the diaphragm than others cause a greater compression of the carbon mass, and permit a larger current to flow than the more delicate sounds in use. Moreover, each vowel is reproduced on account of the passage of the electric current in a certain definite and characteristic wave form. It follows that any modifications of speech which tend to make the enunciation of vowels other than open and clear will cause the transmission of an electrical wave which may be compared to a wave of the sea upon which are riding numerous ripples and wavelets of varying forms. As the form of each of these extra wavelets is somewhat modified or injured by transmission along the line it follows that a clear, distinctly pronounced vowel is reproduced with the greater degree of accuracy. It is not commonly realized that few people pronounce a vowel distinctly. An example of one of the common faults may be secured by pronouncing slowly the letter A with its various inflections. The long A has a tendency to degenerate into E or I at the end. In fact the sound instead of being characteristic of one letter, is a combination of the sounds represented by two or more. Although these facts are well realized by teachers of language and phonetics, the general public has not been trained to appreciate the distinctions

It would seem to be entirely practicable to put some of the burden of inproving transmission upon the public by calling attention to the defects which are generally observed and pointing out the advantages which result from doing away with these faults in speech.

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IN THE OPERATING FIELD

SEVENTH DISTRICT OHIO ASSOCIATION HOLDS ITS MEETING AT LIMA.

THE Seventh district of the Ohio Independent Telephone Association, composed of Allen, Auglaize, Marion, Wyandot, Hancock, Putnam, Paulding, Van Wert, Mercer and Hardin counties, met in semi-annual session at Lima on October 5. Representatives from each of the forty-one companies in the district were present. Vice president George M. Metheany was unable to preside, owing to the death of a sister, and D. J. Cable, president of the Lima company, called the meeting to order, later relinquishing the chairmanship to D. M. Odaffer, of Marion. Independent telephone affairs were discussed, and plans broached for big improvements in individual exchanges. The district has 73 exchanges, as against eight for the Bell; and 86 toll stations, as against 76 for the Bell, while individual subscribers now exceed 22,500. Every company reported an increase in business for the past six months. Present from outside the district were: F. L. Beam, of Mt. Vernon, president of the Ohio State Association, and A. D. Kramer, C. Y. McVey and M. B. Overly, of Cleveland.

PROFITABLE MEETING OF EIGHTH DISTRICT OF INDIANA INDEPENDENT TELEPHONE ASSOCIATION.

THE telephone managers of the Eighth District of the Indiana Independent Telephone Association met at Rushville Oct. 21. The central energy telephone and also the most successful exchange system were two of the leading questions discussed. Among those in attendance were C. S. Norton and J. W. Coffey, Indianapolis; J. W. Cregor, Carthage; W. W. Lines, Richmond; William Frazier, Newcastle; C. A. Phelps, Newcastle; C. W. Boyd, Cambridge City; J. H. Meyers, Newcastle; George Davis, O. M. Dale, B. L. McFarlan, H. E. Barrett, J. H. Frazee, John Kelley, T. M. Green, O. L. Carr and W. D. Root, Rushville.

MISSOURI INDEPENDENT ASSOCIATIONS HOLD DISTRICT MEETINGS.

MEETINGS have been held in the First, Sixth and Seventh districts. Many matters relating to organization and operating were profitably discussed. In the Sixth district the strong Western Missouri Association was merged with the regular district organization. At this meeting Mr. F. W. Buffum, president of the State Association, made a splendid address, showing what progress has been made as a result of the efforts of J. F. Barnett, traveling secretary of the association.

PROGRESS OF INDEPENDENT ORGANIZATION IN INDIANA.

AFTER all the rumors of projected consolidation of Independent plants with its system which have been circulated by the Central Union Company the record shows that the purchases of control of the United Company of Bluffton and the Central Energy of Frankfort stand as the only things of importance really accomplished. The United operated about 5,000 telephones in Marion, Hartford City, Huntington, Montpelier, Upland and Bluffton. Marion had the largest business. The Independents are now overcoming that loss by getting a new line into Marion and the gas belt by means of a combine of the Converse Telephone Company, the Winchester Telephone Company, the Delaware and Madison Counties Telephone Company and the Home Telephone Company of Fort Wayne.

The State is becoming thoroughly organized by the Independents. In addition to the State Association the Indiana Independent Telephone Association, there are the three main subdivisions, the Central, the Northern Indiana and the Southern Indiana associations. These sub-divisions are again divided into district associations, composed of the companies in four or five counties. The meetings of these associations have social as well as valuable business features, consisting of papers on matters of mutual interest and addresses by representatives of the larger associations. The spirit of mutuality and interdependence developed by these associations is such that it is proving the chief obstacle to the plans and ambitions of the Bell. It is another case of "united we stand." The several smaller associations are taking into the fold more members week by week and there will soon be few exchanges in the State that are not affiliated. The Independent companies, large and small, are reaching out with their lines and gathering in new communities and adding to the number of their subscribers. A pamphlet recently issued by the State association shows that the Independents are having wonderful growth. Investors have got over their alarm created when the Bell campaign opened, and Independent telephone securities in the State are now quoted at the highest prices in their history. True, the Bell has not "hurt us much" in the first six months of its attack. It looks as if history is going to repeat itself and the Bell is going to get only another costly experience. Several years ago, when the Independents were young and weak compared to thir present gigantic strength, the Bell people bought Independent plants at South Bend, Logansport, Muncie, Elwood, Frankfort and Noblesville, only to see the prompt installation of new Independent plants that soon had the greater part of the business back. With about six Independent telephones to one Bell instrument in Indiana it is not likely that the tail is going to succeed in wagging the dog.

REVIEW OF TELEPHONE ASSESSMENT IN NEW YORK.

ON the application of the Hudson River Telephone Company a writ of certiorari has been granted by Justice Alden Chester, of the Supreme Court, demanding that the State Board of Tax Commissioners review the special franchise tax assessment of $190,000, fixed on the company's property in Albany for 1905. The company seeks a reduction of the assessment, claiming that it is in excess of the real valuation of the property by $76,000. Some time ago the company secured a reduction of its franchise assessment from $210,000 to $190,000, but still claim the assessment to be too high. The writ is returnable at a special term of the Supreme Court at Albany.

PROGRESS BEING MADE ON INDEPENDENT SYSTEM IN CITY OF MEXICO.

THE New Telephone Company, which is owned by L. M. Ericsson & Co., of Stockholm, Sweden, is pushing its work of laying the underground system in the City of Mexico with much vigor. Some time during next March the company will be able to give its subscribers service, starting with at least 3,000 patrons.

The new exchange will be four stories in height and the estimated cost for its construction is $85,000. It is expected to be finished about January 1, 1906.

FURTHER DEVELOPMENTS IN THE FIGHT IN TENNESSEE.

AN ordinance granting a franchise to the Home Telephone Company was introduced in the city council at Nashville, Tenn., on October 26. It seeks a fifty-year franchise, offers to build a conduit system of sufficient capacity to accommo-

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date all the overhead wires in the city, save those of the electric cars, and to turn the conduit over to the city at its completion, reserving a lien on the rentals accruing from it until the actual cost of construction with 4½ per cent. interest shall have been collected by the Home Company. The company is to give a bond of $50,000 to begin the work of constructing its system within sixty days after securing the right to begin work, and the city is to have the right to purchase the entire plant at the end of twenty-five years at a valuation to be arrived at by arbitration. The company is to furnish in lieu of all taxes, except ad valorem taxes, thirty long-distance telephones to the city free of charge. The charges to be made for the service (with long-distance equipment) are set out in the ordinance as follows:

Individual line service, up to 4,000 subscribers—Per annum, business, $44; residence, $30 (less $1 per quarter if paid in advance).

Over 4,000 and up to 5,000 subscribers—Per annum, business, $52; residence, $34 (less $1 per quarter if paid in advance).

Over 5,000 subscribers—Per annum, business, $60; residence, $40 (less $1 per quarter if paid in advance).

Party line rates—Two-party line, per annum, business, $36 (net); residence, $24 (net); four-party line, per annum, business, $34 (net); residence, $20 (net).

The ordinance, after its passage by the city council, is to be submitted to the people for ratification at a special election.

PROJECT FOR ORGANIZATION OF INDEPENDENT TOLL LINE COMPANY IN SOUTHERN COAST STATES.

COMPANIES operating Independent plants in the South have been much handicapped by the lack of toll line facilities and inability to handle long distance business. Believing that the time is ripe for an organization that shall secure to all the Independent companies the benefits of such service, a circular is being sent out which invites operating companies to participate in such a plan. The idea set forth is that of a long distance company in which the controlling interest shall be divided among the operating companies with whose systems the lines of the new company will be connected. Such a plan, while allowing each company to retain its absolute independence as an organization, permits all to combine and act as a unit to meet competition in the handling of traffic. The movement is being pushed by Wm. J. Stribling and E. S. Moorer.

Mr. Moorer is managing director of the Anderson Telephone Company and president of the Piedmont Electric Company of Anderson, S. C., and is interested in several exchanges in the lower part of that State. Mr. Wm. J. Stribling was until recently State Senator, and is the senior member of the law firm of Stribling & Herndon, and president of the Oconee Telephone Company of Walhalla, S. C. These two companies operate eight exchanges and about 350 miles metallic toll lines. They are Bell sub-licensee companies, but it is believed that sufficient pressure can be brought to bear upon them to induce them to connect with the new company's lines and otherwise assist in the movement.

CHICAGO ELECTRICAL SHOW PLANNING FOR A VERY ATTRACTIVE EXHIBITION.

BEGINNING on January 15 and continuing for two weeks, the Electrical Trades Exposition Company will hold its first annual exhibition at the Coliseum building in Chicago. It is the intention of the management to make this the most comprehensive exposition of the electrical trades ever held in the West. Every phase of the business will be represented, special attention being given to the showing of telephone apparatus and supplies. The entire lower floor of the immense Coliseum building as well as the balconies and galleries has been divided into exhibition spaces, the average size of which is 14 x 12, although some of the exhibits will cover a much larger area. The main floor has been divided into 148 spaces, and in the balconies and galleries there are 74 more, making a total of 222 separate exhibitions. The call upon the management for space has been unprecedented, the manufacturers appreciating the value this exposition will have in placing their wares before the purchasing public. Everything electrical will be shown—telephone apparatus, motors, dynamos, heating and lighting supplies, electrically driven farm machinery, electric clocks, fire alarm systems, bells, annunciators, besides electrical apparatus used for scientific purposes, such as X-ray machines, wireless telegraph and telephone equipments and many other new and novel devices requiring the aid of electricity for their operation. In order to popularize the event and to enable every one to become acquainted with the application of electricity the price of admission has been placed at 50 cents for adults and 25 cents for children. Complete official programmes will be distributed free of cost. Every effort is being made to provide all possible conveniences and attractions which will contribute to the pleasure of the public and exhibitors. Telephone, telegraph, messenger and stenographic service will be furnished at the usual rates. An excellent a la carte restaurant service will be provided besides a well stocked buffet. A string orchestra will play selections afternoon and evening in the Rest room, and a full band will render the music for the main exhibition hall.

The exhibition will be open daily except Sunday from 10 a. m. to 10:30 p. m.

Of special interest to our readers will be the exhibit of telephone apparatus. This will include many novelties and new ideas, which will be shown to the public for the first time. To those who desire to get in touch with the business from the apparatus standpoint the exhibition will offer an opportunity which will be of incalculable benefit.

SEMI-ANNUAL MEETING OF CANTON DISTRICT OF OHIO ASSOCIATION.

AT the recent meeting of members of this district a large number of telephone men were present. Discussions of the subjects of long distance telephony and automatic exchanges were held, and addresses were delivered by F. L. Beam, Columbus; C. Y. McVey, Cleveland; M. B. Overly, Cleveland, and manager Stratton of the Minona Telephone Company.

INDIANA COMPANIES HAVE NEW OFFICIALS.

THE property of the Indianapolis Telephone Company and the New Long Distance Telephone Company passed into new hands October 26. Immediately following the transfer the following officers were elected: For the Indianapolis Telephone Company, president, H. C. Stifel, of St. Louis; vice-president, James S. Brailey, Jr., of Toledo; directors, John H. Holiday, Indianapolis; A. H. Bauer, St. Louis, and B. A. Altheimer, of St. Louis. For the New Long Distance Company, president, H. C. Stifel, St. Louis; vice-president, C. M. Foster, St. Louis; directors, Breckenridge Jones, St. Louis; J. S. Brailey, Toledo; A. F. Ramsey, Crawfordsville; M. B. Wilson and Louis Holwegg, Indianapolis.

The new officials announced that the companies would remain absolutely independent; that it was their intention to expend a million dollars a year for three years in pushing the companies to a wider, more efficient and useful service to the whole State. The fight against other companies not Independent will be taken up with renewed vigor and it is believed that this deal marks the beginning of the utter routing of the Central Union Company.

No changes have been made in the local force; H. B. Sale will continue as general manager of both properties.

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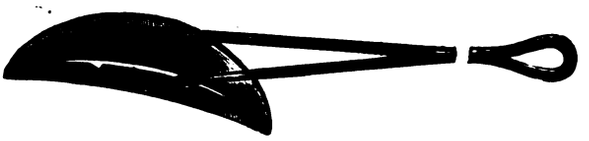

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TELEPHONE PATENTS

SELECTIVE SIGNALING.

Egbert A. Reynolds, of New York, N. Y.; patents (No. 802,597; dated October 24, 1905; filed August 19, 1904; serial No. 221,362; assignor to Iron Telephone Company, of New York, N. Y.) selective signaling apparatus.

This invention relates to calling devices adapted for use in party line telephone systems. A number of generators are employed, of a variety of frequencies respectively, in conjunction with a plurality of polarized ringers. Harmonic ringers are used, in which the clapper only responds to a certain current frequency. The invention covers a form of ringer, in which the adjustment to any frequency is quickly made. By this means, a set of standard bells may be adjusted to meet all requirements in this respect. In total, the flexible clapper, by means of a sliding piece engaging with said clapper, extends or limits the degree of vibration it is capable of, and thereby enables an adjustment of vibration to be made, to agree in synchronism with the frequency of the alternating current tending to cause vibration.

CALLING DEVICE.

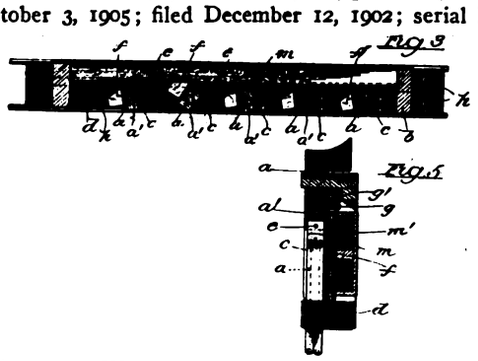
Frank A. Lundquist and John K. Norstrom, of Chicago, Ill., patent (No. 799,346; dated Sept. 12, 1905; filed Aug. 27, 1904; serial No. 28,104, and assigned by mesne assignments to M. E. Richardson, trustee, of Sterling, Kansas) a calling device for automatic telephone exchanges.

In this patent, relating to calling devices for automatic telephone exchanges, the invention is a device, by which certain important and complicated contacts are made with accuracy.

This is accomplished by a particular arrangement of switches by which contacts are made; the original actuating influence proceeding from a series of indicators making the first contacts and thereby sending over the line the currents which operate said switches automatically.

TELEPHONE SWITCHBOARD KEY.

Frederick H. Loveridge, of Chicago, Ill., patents (No. 800,747; dated October 3, 1905; filed December 12, 1902; serial No. 134,-

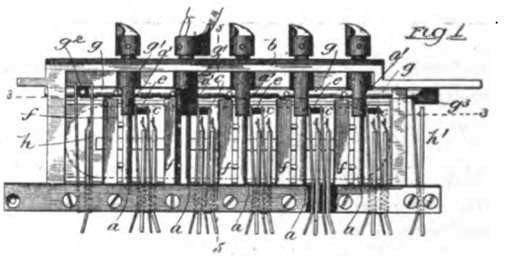


941; assignor to Western Electric Company of Chicago, Ill.) a key for telephone switchboards.

This invention relates to a switch key of improved construction, particularly adapted to party line work, and to be mounted in the horizontal key shelf of a telephone switchboard.

In this key, each set of switch springs, instead of being actuated by depressing a plunger, is actuated by a cam rotatable upon a vertical axis, with a crank lever to rotate said cam. A sticking magnet of E shaped core cross section, is shown in Fig. 5, utilized by means of its three polar faces to control the position of the key by means of certain vertical shafts comprising the ringing key. The magnet carries a coil M^1 upon the core M in Fig. 5. The shafts mentioned, shown as *a* Fig. 3, carry an insulating cam piece A^1, to actuate certain corresponding switch springs C when the shaft is rotated. Each shaft carries an armature bar F, which is swung against the polar faces of the magnet when said shaft is rotated to actuate the switch springs.

In total, the magnet is energized until the called subscriber answers; so that the key once actuated, will be held over to



apply the ringing current continuously, until the called party shall respond; after which the magnet will be deenergized and permit the shaft to return to its original position through the elastic switch springs bearing upon the cam piece A^1.

In Fig. 1 is shown a view of the key in elevation, which is shown sectionally in Fig. 5, along the line 5, 5 of Fig. 1. Fig. 1 represents a party line ringing key, having five sets of switch springs and shows the five actuating shafts at *a*, mounted veritcally. Each shaft, it may be noted, carries a fin shaped crank lever, to be pulled by the operator's finger, to rotate said shafts as described. In this sketch the five sets of switch springs are used for applying specialized ringing currents for the selective ringing of substation call bells.

PORTABLE TELEPHONE.

Walter N. Clark, of Warren, Ohio, patents (No. 801851; dated October 17, 1905; filed October 1, 1904; serial No. 226,851) a portable telephone.

In this device the idea is to provide in a desk telephone a receiver support of ready adjustment. In addition a main base is provided by it to which any desk telephone can be secured. A method of jointing employed in the parts composing the two part lever holding the receiver, permits of any degree of orientation on the part of the user with respect to the transmitter, including by this means a position for either ear if desirable. The character of junctures employed in the lever are specified in the claims as knuckle joints at the inner and outer ends of the receiver support.

SWITCHING APPLIANCE.

Carl M. Hedman, of Chicago, Ill., patents (No. 799,160; dated September 12, 1905; filed May 22, 1902; serial No. 108,534, and assigned by mesne assignments to Stromberg-Carlson Telephone Manufacturing Company, of Rochester, N. Y.) a switching appliance for telephone exchanges.

This invention relates to a device by which a change of circuit conditions is readily effected. The switching apparatus is self-locking in one position, the construction being designed to enable the operator of an exchange to readily change circuit conditions as necessary in inter-connecting subscribers for conversation. It also provides a new ringing and listening key. A feature is the use of friction reducing rollers in increasing the durability of the key.

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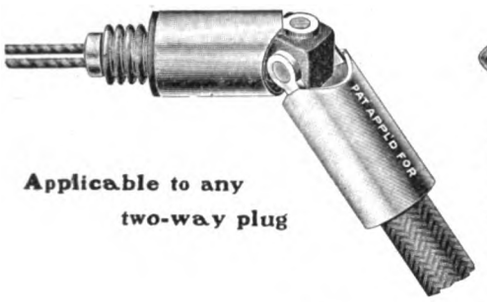
UNIVERSAL CORD JOINT



Applicable to any two-way plug

By the Use of this Cord you will have **No More Cord Troubles**

Send Us $1.00 with one of your plugs and we will equip the plug with a Universal Joint and 6 foot Cord and return to you prepaid.

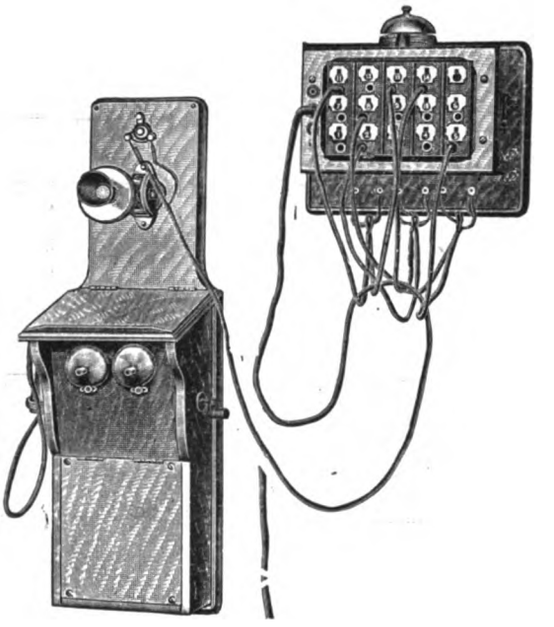
M. B. AUSTIN & COMPANY

56 AND 58 W. VAN BUREN STREET, - - - - CHICAGO

The United Telephone and Switchboard Co.

Succeeding the Gemmill Telephone & Mfg. Co., recently damaged by fire, have moved into their commodious and modern factory. All apparatus is of the highest grade construction and guaranteed for five years.

If you wish to secure the best possible service you must have the best apparatus. Send for catalogue, prices and sample telephones for inspection and test.



The United Telephone and Switchboard Co. Orrville, Ohio.

THE D. & T. ANCHOR

DRIVE — AND — **TWIST**

45 Seconds — 15 Seconds

NO INSTALLING EXPENSE — NO SLACK LEADS

The ONLY Anchor that can be installed in rocky soil.
The ONLY Anchor that does not give when the strain is put on,
The ONLY Anchor that PULLS on SOLID EARTH.
In Fact the ONLY ANCHOR.

Write for circular and our souvenir model.

THE D. & T. ANCHOR CO., La Crosse, Wis.

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IN THE MANUFACTURING FIELD

"SUCCESS LIES IN THE KNOWLEDGE OF OUR TOOLS"

THE QUEEN PORTABLE CABLE TESTING OUTFIT.

THE cable testing outfit put on the market by Queen & Co. consists of a combination of a portable, high sensibility D'Arsonval galvanometer, together with tripod and a combination instrument box containing a number of accessories such as condenser, sub-divided 100,000 ohm coil, shunt, Wheatstone bridge, keys, condenser posts, etc. The high sensibility D'Arsonval galvanometer, is built of punchings of thin sheet steel each separately hardened and magnetized. A telescope and scale is attached directly to this magnet and the moving coil is contained in a brass tube which fits into an annular opening in the magnet and encases the coil securely from air drafts or mechanical injury. Coils of different resistances can be mounted in different tubes and a magnet supplied while several of these tubes can be used for a wide variety of purposes. Also the coils can be made either ballistic or deadbeat as desired.

The testing box proper contains the following pieces: Battery of 50 silver chloride cells (more or less can be supplied as necessary); a postoffice form Wheatstone bridge and rheostat giving a theoretical range of measurement from .001 to 10,000,000 ohms, this bridge making not only resistance measurements, but also the Murray and Varley tests.

The condenser is subdivided into five sections of .1 M. F. each, giving a total capacity when connected in multiple, of .5 M. F., and when connected in series .02 M. F. Various arrangements of serics and multiple combinations can be formed, and this, in connection with the Ayrton shunt enables capacities from 1-1,000 up to 1,000 M. F. to be accurately measured. The shunt is of the Ayrton type, which may be used in connection with galvanometers of different resistances while the shunting value still holding true. It has four values, 1 1-10, 1-100 and 1-1,000. The shunt being used in making insulation measurements has its blocks mounted on corrugated hard rubber pillars to secure the necessary insulation. The standard 100,000 ohm coil is sub-divided into coils of 10,000, 30,000 and 60,000 ohms for convenience in taking the constant of the galvanometer in insulation measurements. Its terminal blocks are also mounted on corrugated hard rubber pillars, battery and galvanometer keys also arranged with high insulation and with catch and spring to be used as Kempe, Lambert or double contact and short circuit keys.

It should be noticed that all the connections in circuit when the set is used in measuring insulation resistances and capacity are insulated with great care, being mounted on corrugated hard rubber pillars. These pillars extending *through* the hard rubber plate and being corrugated for an inch below the surface, the highest insulation is thus insured.

Queen Portable Cable Testing Outfit Set Up for Use.

The outfit also includes a sole leather carrying case with two handles and shoulder strap, containing the entire outfit when packed. The weight of the complete outfit packed is about 60 pounds, and the dimensions approximately 7 inches deep by 22 inches high and 24 inches wide. For further information write the makers at 1010 Chestnut St., Philadelphia.

THE FAHNESTOCK BINDING POST. NO. 7.

THERE are exchanges where annoying troubles have been traced to a battery connection which was twisted around a lug, but not soldered, or was attached to an imperfectly tightened binding post. The spring binding post illustrated on this page is designed to prevent such troubles. The manufacturers claim that once a wire is attached to this device a sure connection is secured until the wire is intentionally removed; moreover even a careless inspector can make only one kind of contact—a firm one.

The No. 7 binding post is of the same general design as the smaller spring post, which this company has been making for some time, but is of a size to grip any size wire up to and including No. 5, B. & S. It is particularly recommended by the manufacturers for all large wire connections in exchanges, and should find a special field of usefulness when associated with certain portions of battery circuits and those to small machines. Full information will be furnished on application to the Fahnestock Electrical Company, successors to the Fahnestock Trans-

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THINK OF ME

Every time you use or buy telephone construction iron, remember I am the maker of the "BULL TONGUE" Land Anchor, and also sell everything else in telephone construction iron.

My Anchor is the best and cheapest made. It is easier and quicker to instal, and holds better than any made.

Write for my book.

I. A. BENNETT

CHICAGO

141 South Clinton Street

BE AS HONEST

with yourself as we are in the manufacture of *International* Apparatus. Give us the opportunity of estimating on your next order for telephones or switchboards. Recent installations in the U. S. and Foreign Countries are convincing.

International Telephone Mfg. Co.

HARRISON AND CLINTON STS.

CHICAGO, ILL.

OWING to the limited number of copies carried on file and the large demands, back numbers of THE AMERICAN TELEPHONE JOURNAL will hereafter be sold for twenty-five cents per copy.

THE AMERICAN TELEPHONE JOURNAL,

116 NASSAU ST. CITY OF NEW YORK

Here Are Some Facts for You to Remember

WE are able to quote you the lowest possible prices upon all kinds of line construction hardware.

WE have the most varied stock carried by any manufacturer or dealer.

EVERY article we have for sale is the best money can buy.

WE have had over twenty years' experience in selling this line of goods and therefore know what is wanted.

WE will furnish you with estimate blanks free of charge.

WE will give your order personal attention.

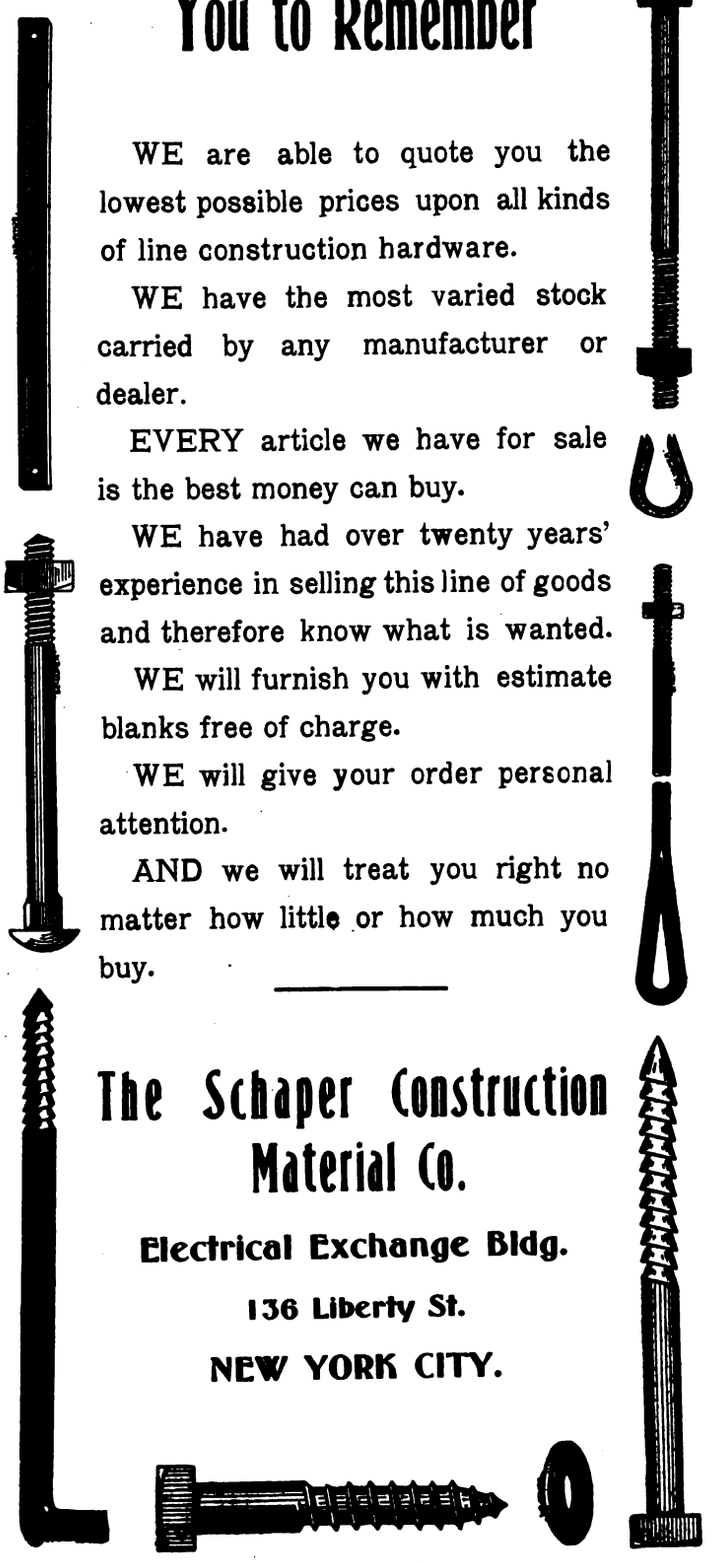
AND we will treat you right no matter how little or how much you buy.

The Schaper Construction Material Co.

Electrical Exchange Bldg.

136 Liberty St.

NEW YORK CITY.



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mitter Company, 132 Havemeyer street, Brooklyn, N. Y.

M. B. AUSTIN & COMPANY since entering the telephone field as manufacturers, have made a specialty of introducing money saving devices, and the elimination of existing troubles. Their latest device and one that seems to merit the attention of every telephone man, is a universal cord joint. By use of this joint it is claimed that there will be no more broken switch cords. Where the cord enters the plug they insert their universal joint, which is a flexible one that takes all strain from the cord. The cord hangs in a direct line with the plug socket, and is subjected to no wear whatever except in pulling it through the cord shelf. The manufacturers tell us that a great many exchanges have installed these joints and that up to the present time they have received no unfavorable criticism. If this plug is all that they claim it will certainly enable the exchanges installing them to materially reduce their maintenance expenses, as the replacing of broken cords is a very considerable item. Further information can be obtained by writing to the manufacturers at 58 W. Van Buren St., Chicago, Ill.

Side View of Fahnestock Spring Binding Post.

H. D. STROUD, 5225 Kensington avenue, St. Louis, Mo., has opened an office as a telephone service engineer. His specialty is making service studies and furnishing estimates to telephone companies for the betterment of both flat rate and message rate service. Mr. Stroud also has on the market a shield shaped pay station sign in colors as adopted by the National Interstate Telephone Association, which he can furnish with any lettering and with a long rod for setting in sidewalks. He will be glad to hear from interested parties.

BAKER & COMPANY, Inc., refiners and manufacturers of platinum, gold and silver, Newark, N. J., and New York city, have been awarded a gold medal for the excellency and variety of their exhibit at the Lewis & Clark Centennial Exposition, just closed at Portland, Oregon. The exhibit was comprehensive in its character, including numerous samples of crude platinum ore, the salts and solutions of the metal, and various forms of platinum ware, such as are used daily in the arts and industries.

THE CENTURY TELEPHONE CONSTRUCTION COMPANY, Buffalo, N. Y., is sending out a folder upon which appear cuts which clearly illustrate the construction of its transmitter and receiver. The transmitter is of the "Platinum electrode" type, and the manufacturers' claims for the instrument's efficiency, reliability and freedom from defects are set forth. The Perfection receiver No. 11 embodies several new features designed to increase its sensitiveness and make it mechanically satisfactory. The company offers to send either instrument to interested parties for a free trial, with charges prepaid.

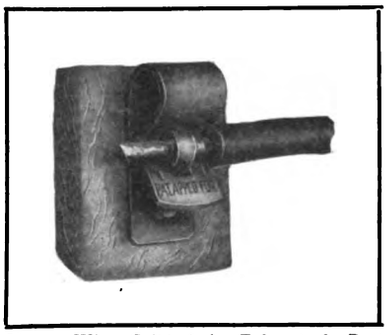
THE BAIRD MANUFACTURING COMPANY, 6 Michigan street, Chicago, has just placed on the market a new duplex switchboard counter which fills a long felt want. One set of dials records total counts up to 100,000 and cannot be set back, while another set records up to 1,000, but can be set back to zero at any time. This counter should also prove very useful for other purposes than monthly peg counts.

SOME EXHIBITS AT THE NEW YORK BUSINESS SHOW.

AMONG the exhibitors at the recent office appliance and business system show in New York were the following firms who showed devices of interest to telephone users:

THE DEVEAU TELEPHONE MANUFACTURING COMPANY, New York, had an extensive exhibit in charge of its manager, Mr. Allen. Several different types of its automatic instrument were shown, as well as a complete line of switching instruments. Several of the instruments were finished in special colors and nickel plate to illustrate the fact that the firm is prepared to make its instruments fit any surroundings.

THE OLIVER MANUFACTURING COMPANY, of Philadelphia, Pa., was represented by W. B. Oliver and P. S. Conrad, of Philadelphia. This firm manufactures the Equipoise holder. Since its introduction it has been greatly improved and standardized. Two types are made at present. One for use with roll top desks, the other being adapted to any ordinary use. This holder can be adjusted to any position. Extra parts are provided to lengthen it if so desired, and the complete instrument is arranged to pack in a box of suitable dimensions so that it can be kept in stock. The firm reports large orders resulting from this exhibit, including one from the Chamber of Commerce of Sacramento, Cal.



Heavy Wire Gripped in Fahnestock Post No. 7.

THE PERRY TIME STAMP COMPANY of Chicago, Buffalo and New York exhibited its time stamp. The design of this instrument is novel, resembling in general appearance an ordinary self-inking dating stamp. The manufacturers claim for this device extreme accuracy, indestructibility and compactness. The exhibit was in charge of E. B. Strunk of New York and George B. Johonuot of Buffalo.

THE STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY of Rochester, N. Y., had a most extensive exhibit. Its representatives were F. W. King and J. O. Oliver of Rochester; H. A. Jones of Philadelphia and J. S. Gibson, New York representative from Albany. It wired up the entire exhibition space for telephone service and furnished exchange service to sixty different booths. Among its exhibits was a 140 line fully equipped common battery board with storage battery, power board and ringing machine. Two common battery private branch exchanges of 60 lines capacity each and one generator call visual signal board for the same number of lines. An extensive line of magneto and common battery instruments were shown, including the hotel type all steel box instrument.

THE NAPP REFERPHONE COMPANY, INCORPORATED, 703 Flatiron Building, New York, exhibited a tablet devised for recording telephone numbers. Several cards framed with a metal border are held to a support attachable to wall or desk stands.

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SUMTER

SOLD ON QUALITY—NOT ON PRICE

OH YES.

We have made telephones for rural and toll line work for the past seven years. Our thousands of satisfied customers will gladly testify to their many qualities; from the Pacific to the Gulf, "Sumter" stands for "QUALITY" and satisfaction.

THE SUMTER TELEPHONE MANUFACTURING CO.

SUMTER, S.C., U.S.A.

TELEPHONES, SWITCHBOARDS

The SUMTER FACTORIES

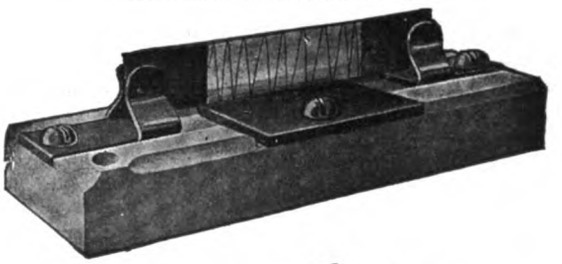
GET IN LINE ON UP TO DATE APPARATUS

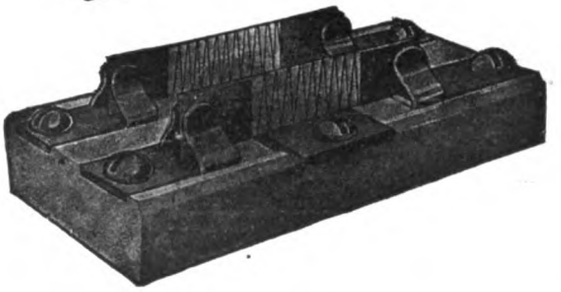
If you order Central "Leader Junior" Telephones you will be buying now what you are sure to buy ten years from to-day.

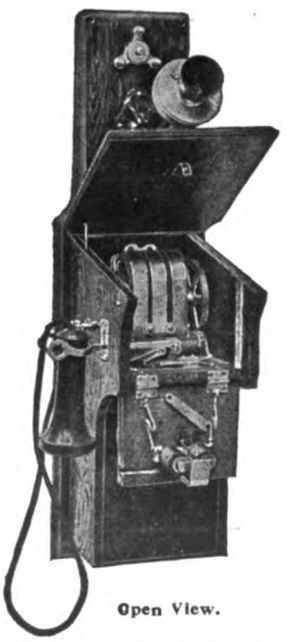
Closed View.

CENTRAL FUSE BLOCK

LIGHTNING ARRESTERS







Open View.

Sample Series—4 Bar or 5 Bar Bridging Leader Junior Telephone shipped to any responsible party in the United States on 30 days' trial prepaid freight.

Sample Fuse Block as above sent free on request to any one mentioning this ad.

CENTRAL TELEPHONE & ELECTRIC CO.

2135 Lucas Ave., St. Louis, U. S. A.

Chicago Agents
Empire Electric Supply Co.
334 Dearborn St.

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FINANCIAL.

SIBLEY, ILL.—The Sibley Telephone Company has increased its capital stock from $4,000 to $12,000.

GRAND RAPIDS, MICH.—The Citizens' Telephone Company paid its thirty-third consecutive quarterly dividend to the stockholders yesterday.

DALLAS, TEXAS.—The Consolidated Long Distance Telephone Company at a meeting held in Dallas to-day decided to double its capital stock by increasing it from $60,000 to $120,000. Amendment to the company's charter will be sent to Austin.

FRANCHISES.

TITUSVILLE, FLA.—G. L. Mandaville has been granted an exclusive franchise for twenty years for the operation of a telephone system in the town of Titusville.

OAKLAND, ILL.—The Home Telephone Company has applied for a franchise to install a plant in the city of Oakland.

PINCKNEYVILLE, ILL.—The Pinckneyville Telephone Company will apply for a franchise at the next meeting of the City Council, for a term of twenty years.

ALBERT LEA, MINN.—The Tri-State Telephone Company has been granted a 20 year franchise to operate an exchange, and will commence building a $40,000 exchange at once.

ARCADE, N. Y.—The Frontier Telephone Company has made application to the Village Board for a franchise, and from all indications it will be granted. Among other things, it agrees to give the village an electric fire alarm service.

TICONDEROGA, N. Y.—The Ticonderoga Home Telephone Company has been granted a franchise in Ticonderoga.

FORT WORTH, TEXAS.—A motion was introduced at the session of the City Council to grant F. T. Elroy, of Fort Worth, and associates, a franchise for a telephone system.

OLYMPIA, WASH.—Charles E. Sumner has secured a thirty-five year telephone franchise at Olympia. Work will probably be commenced on the system at once.

MILWAUKEE, WIS.—Harold D. Stroud, of St. Louis, acting as representative of the People's Postal Telephone Company, is to apply for a franchise for that company in Milwaukee.

ELECTIONS.

COLORADO CITY, COL.—Officers have been elected by the El Paso Telephone Company as follows: W. R. Ennis, president; J. H. Ridenour, vice-president; W. F. Willoughby, secretary; C. H. Watson, treasurer.

LINCOLN, IA.—At the annual meeting of stockholders of the Lincoln Township Telephone Company the following new officers were elected: Charles Graff, secretary; Grant Murphey, treasurer, and Chris Gau, director.

SIOUX CITY, IA.—At a meeting of the directors of the Sioux City Telephone Company the following officers were elected: T. A. Thompson, president; Howard S. Baker, vice-president; George C. Scott, secretary, and E. W. Rice, treasurer.

YERINGTON, NEV.—The Yerington Electric Company has elected the following officers: J. J. Wilson, president; E. R. Lam, secretary; C. W. Gallagher, treasurer. The company proposes to extend its lines at once.

WAYNE, O.—The recently elected officers of the Wayne Telephone Company are: President, C. R. Bellard; treasurer, W. A. Van Scoyoc; secretary, R. E. Dillon. These three, with R. A. Russell and Charles Camp were elected the Board of Directors.

CHARLOTTESVILLE, VA.—At the annual meeting of the stockholders of the Albemarle Telephone Company the following officers and directors were elected for the ensuing year: F. W. Twyman, president; J. B. Andrews, vice-president; Board of Directors, J. M. Robertson, J. B. Andrews, Daniel Harmon, P. Leterman, T. J. Wills, Thomas S. Keller, C. H. Walker, S. C. Chancellor, John B. Moon, James F. Harlan, W. J. Tyson and F. W. Twyman.

NEW COMPANIES.

MEDICINE HAT, ALB., CANADA.—The Board of Trade has appointed a committee to see what can be done towards obtaining a municipal telephone system on account of the thoroughly inadequate service now given there.

TILBURY, ONT., CAN.—An Independent telephone company has been formed at Tilbury.

EARL, ARK.—The Earl & Tyronza Telephone & Telegraph Company has been incorporated with a capital stock of $5,000. President, J. F. Rhodes; vice-president, H. A. Morrison; secretary, John M. Taylor.

BOULDER, COL.—The Northern Telephone Company has been incorporated with a capital stock of $250,000, by C. H. Samsay and others.

LONG GROVE, IA.—The Long Grove Mutual Telephone Company has been incorporated with a capital stock of $10,000. President, R. K. Brownlie; vice-president, Leonard Litscher; secretary and treasurer, Dr. G. B. Maxwell.

HUTSONVILE, ILL.—The Hutsonville Telephone Company has been incorporated with a capital stock of $3,700. The incorporators are: C. D. Ryerson, C. H. Voorheis, Clinton Newlin.

NEW MILFORD, ILL.—F. E. Pell and Arthur Chase are reorganizing an Independent telephone company in New Milford. The company is to have a capital stock of $5,000, and it is the intention to have an exchange with about 100 telephones.

HIGHLAND, KAN.—The Highland Telephone Company has been incorporated with a capital stock of $800.

HOXIE, KAN.—The Valley Telephone Company has been incorporated with a capital of $500.

ROCHESTER, N. Y.—The American Automatic Telephone Company has been incorporated with a capital stock of $1,500,000.

FORT LAWN, S. C.—A new stock telephone company has been organized at Fort Lawn. Mr. Less Abernathy is president of the company, and Mr. Chapman manager.

CUSTER, S. D.—Articles of incorporation have been filed for the Eldorado Mutual Telephone Company at Custer, with a capital of $25,000. The incorporators are: William Nevine, T. V. Carlock, Thomas W. Delicate.

HURON, S. D.—The State Independent Telephone Company has been incorporated with a capital stock of $1,000,000. Incorporators: K. G. S. Hutchinson, Coe I. Crawford, Huron; R. F. Pettigrew, George W. Burnside, Sioux Falls; Andrew L. Lee, Vermillion, S. D.; E. A. Bruce, Yankton; E. C. Ward, Geddes; E. H. Moulton, Minneapolis; J. Novotny, Yankton.

COMBINATIONS.

LETHBRIDGE, ALB., CAN.—Alderman McClure has given notice that at the next Council meeting he will move that a by-law be prepared to enable the town to purchase the telephone system from the company now operating it, and to run it under municipal ownership.

UTE, IA.—The Soldier Valley Mutual and New State Telephone Company have concluded negotiations whereby the Soldier Valley Mutual Telephone Company obtains possession of the Ute exchange and country lines.

LEWISTON, IDAHO.—The Lewiston-Clarkston Telephone Company is to connect the exchange about to be installed at Lewiston, Idaho, and at Clarkston, Wash., with the Cloverland-Astoria lines.

CASEY, ILL.—The Shimel Telephone Company, at Casey, has absorbed the Lafferty system of 850 telephones, and the Fitch system, which operated there and in Greenup.

TERRE HAUTE, IND.—The Citizens' Telephone Company, of Terre Haute, Ind., has passed to the control of the Kinloch interests, which secured 55 per cent of the stock. It is announced that the capital stock will be increased to $375,000 and ultimately to $750,000. From $100,000 to

NEWS—WANTED

THE matter contained upon the Message and Operating Field pages of this paper is contributed largely by our special correspondents. We believe, however, that there are many valuable items of telephonic interest which are never brought to the attention of the public. There is no reason why this condition should exist, and the Editor, therefore, invites all telephone companies, and the officials of such companies, to furnish any information that they can consistently make public relative to financial statistics, new construction, elections, franchises and personal items.

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Kellogg Switchboard and Supply Co.

CHICAGO, ILL.

Wholesalers of **Michigan White Cedar** **POLES** *of* **QUALITY**

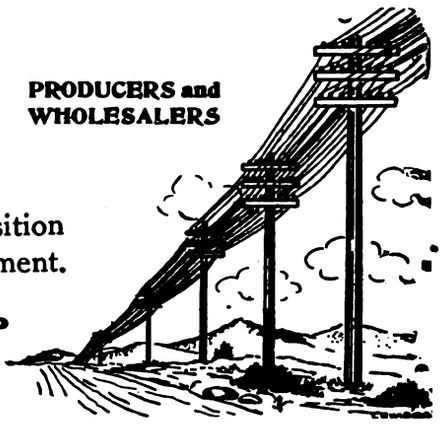
Five Yards ***Prompt Shipments***

PITTSBURG & LAKE SUPERIOR IRON CO.,
ESCANABA, MICHIGAN.

PRODUCERS and WHOLESALERS

WE always carry a large stock of all sizes of White Cedar Poles, and having yards on all principal railroads in Northern Michigan and Minnesota, are in position to make immediate shipment.

"From the Stump to the Line."



POLES are POLES

But Some Differ

If you want the right kind; we have them. No matter what your specifications call for in the line of cedar poles we can fill them,

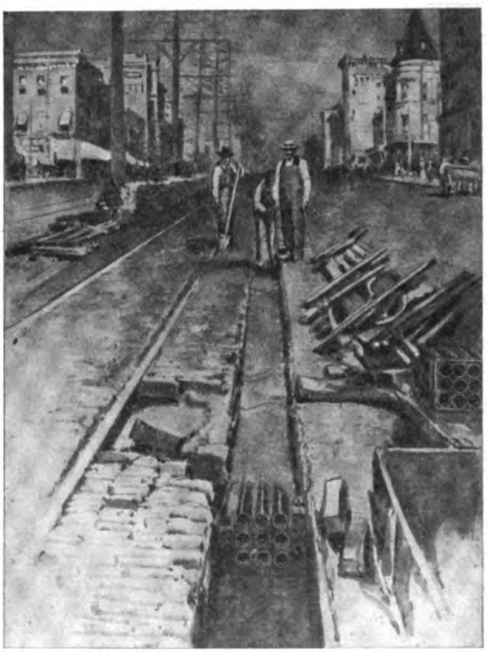
And Do So Honestly

All sound timber and straight.
All sizes of tops and butts.
No delays in shipment.
Aren't these some good reasons why you should give us a trial.

THE SAND POINT CEDAR CO.

SAND POINT, IDAHO

BITUMINIZED FIBRE CONDUIT
For Underground Construction



The American Conduit Company has a corps of experts in underground construction and is prepared to furnish supervision of work if desired. We would prefer to co-operate with contractors in underground construction, but if desired will submit estimates and bids and take contracts for completed underground systems in any part of the United States or Canada.

AMERICAN CONDUIT COMPANY,
Main Offices, 1005-6 Manhattan Building, Chicago
Other Offices, 170 Broadway, New York 336 Macy Street, Los Angeles

Please mention THE AMERICAN TELEPHONE JOURNAL when writing to ADVERTISERS.

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THE WEEK'S MESSAGES

$250,000 will be expended in improvements, which will include a costly up-to-date exchange building. The Terre Haute men who founded the company retain stock in the new organization. The name of the company will not be changed, but the following officers have been elected: President, C. M. Foster, of St. Louis; vice-president, W. P. Ijams, of Terre Haute; secretary, Roy McCanne, of St. Louis; general manager, G. L. Hutchinson.

NEW ULM, MINN.—The New Ulm Rural Telephone Company has completed arrangements for long distance connection with the Nicollet County Telephone & Telegraph Company.

MISCELLANEOUS.

SAN DIEGO, CAL.—Connections from La Jolla and Cuyamaca to this place have recently been completed by the Home Telephone Company. A direct line to Los Angeles will soon be in service.

DOWS, IA.—The Rowan Rural Telephone Company has installed a new switchboard and extended and improved its lines.

FREEMAN, IA.—The Independent Telephone Company has recently completed its new lines to Brushy and Border Plains.

DWIGHT, ILL.—The new telephone plant at this place has recently been completed. There are 300 telephones in town and between 300 and 400 on the eighteen different farmer lines. A rough estimate of the cost of material, labor, etc., expended in reconstruction of the system places the figure at $26,000.

HASTINGS, NEB.—The Independent Telephone Company expects to cut its underground cable plant into service within a few days.

LORAIN, O.—The Black River Telephone Company has recently put into service its new switchboard.

NASHVILLE, TENN.—The State Board of Equalization has been hearing two appeals from two telephone companies over the assessments made against them by the Railroad Commission, one being the case of the Memphis Telephone Company, and the Gainesboro (Tenn.) Telephone Company being the other. The former company was represented by its manager, R. H. Polk, whose company is assessed at $150 per mile on its line, making the total assessment $128,725. The case of the Gainesboro company was presented by James N. Cox, manager. The assessment in this instance was $50 per mile, or a total assessment of $74,700. Both arguments were taken under consideration by the Board.

BEAUMONT, TEX.—The principal office of the Lone Star Telephone Company has been moved from San Antonio to Beaumont. C. W. Emmer was recently appointed manager of this company by Receiver Mackey.

CHOLULA, STATE OF PUEBLO, MEXICO.—An extensive system of telephone lines has been built with this city as the center. These lines connect twenty-three towns with Cholula.

MONTEREY, MEXICO.—The records of the State government of Nuevo Leon show that there are in this State 2,105 kilometers of telephone lines, with 985 exchanges, in operation. Twenty-five towns of the State have telephone connection with Monterey.

TECALI, STATE OF PUEBLO, MEXICO.—A telephone line has just been completed from Tecali, to the towns of San Luis and Tepeaca.

PERSONAL.

CHARLES W. FOSTER has been appointed local manager for the Delaware and Madison Telephone Company at Elwood, Ind.

HARRY W. JOHNSON has been appointed manager of the Ebensburg, Pa., Telephone Company.

E. POSEY has been appointed manager for the Citizens' Telephone Company at Tyler, Texas.

MERTEN H. TURNER, of Ashtabula, O., has taken charge of the management of the Central Union Telephone Company's business at Bellefontaine, O.

C. E. VALE has been appointed district foreman for the Wisconsin Telephone Company at Fond du Lac.

W. H. WALLACE, of Toledo, has been appointed manager of the Home Telephone Company, of Washington, Ind.

New Construction in the Field

DUQUOIN, ILL.—The Duquoin Telephone Company is building a line from Duquoin to Christopher.

ABYDEL, IND.—The Mathers Telephone Company is to materially improve its system.

OAKTOWN, IND.—The plant of the Oaktown Telephone Company is being overhauled and new equipment is being installed. Fifteen miles of new line will be built and a new switchboard will be installed.

PADUCAH, KY.—The Paducah Home Telephone Company is making long distance connections between Paducah and Nashville and Paducah and Birmingham, Ala.

OAKLAND, MINN.—The Trio Telephone Company is building a line to Moscow.

PHILBROOK, MINN.—The directors of the Philbrook Telephone Company met in Browerville to provide means to complete the line and arrange for connecting with the Browerville exchange.

THIEF RIVER FALLS, MINN.—The Thief River Falls Telephone Exchange is extending its long distance lines to a number of the towns in this vicinity.

MONTROSE, MISS.—The Jasper County Telephone Company is extending its line to Bay Springs.

MACON, MO.—The Macon Telephone Company has purchased a lot and will erect thereon a handsome two-story building suitable to its growing needs.

WATSON, MO.—The New Mutual Telephone Company is considering building a line from Watson to Rock Port.

BLAIR, NEB.—The Blair Telephone Company expects to make considerable improvements during the coming year.

HORNELLSVILLE, N. Y.—The Interocean Telephone Company will build a telephone line from Hornellsville to Avoca through Howard this fall. It will connect with the lines of the Overland Telephone Company.

KINGSTON, N. Y.—The Citizens' Standard Telephone Company has asked permission to place its wires underground.

MALONE, N. Y.—The Franklin County Telephone Company is to extend its lines to Bellmont Center.

PULASKI, N. Y.—The work of building a line from Richland to Watertown by the Black River Telephone Company is well under way.

SYRACUSE, N. Y.—The Syracuse Independent Telephone Company is placing its wires underground.

GRAND FORKS, N. D.—The Tri-State Telephone Company is to build a line from this city to Ardoch.

COLUMBUS, O.—The Citizens' Telephone Company will soon be prepared to install new telephones, with few exceptions, throughout that part of the city east of Fifteenth street. The first working district will be from East Taylor avenue north of Broad, then east from Wilson avenue between Broad and Bryden, then east from Eighteenth between Mt. Vernon and Bryden. The old manual switchboard has been abandoned except for rural line and private branch exchange work, and the switching section of the new long-distance switchboard is in operation.

EATON, OHIO.—The Eaton Telephone Company has commenced the construction of a direct line to Dayton.

GALLIPOLIS, O.—The Gallipolis Telephone Company is to greatly improve both its local and long distance service.

NEW LEXINGTON, OHIO.—The Perry County Telephone Company is preparing to build its plant at this place. The directors at the meeting decided to spend $8,000 on the new plant.

ZANESVILLE, O.—The Zanesville Telephone & Telegraph Company is to spend $50,000 in improving its system.

THOMAS, PA.—The McMurray Telephone Company is building a line to Venetia, where it has secured a number of new subscribers.

GAYVILLE, S. D.—The Independent Telephone Company is building a line from Gayville to Vermillion.

EL CAMPO, TEXAS.—The Gulf Coast Telephone Company, which has offices at El Campo, Midfields, Blessing and Palacios, has completed its line to Markham.

LOGAN, UTAH.—The Independent Telephone Company, of Logan, Cache County, is to build a line to Preston, and will install exchanges at Preston and Richmond. It is also building lines to Wellsville, Hyrum and Paradise.

PARK CITY, UTAH.—The Independent Telephone Company has commenced its construction work in Park City.

WYTHEVILLE, VA.—The Mutual Telephone Company is to make further extensions to its system.

SEATTLE, WASH.—A franchise has been granted R. D. Nichols to construct telephone lines to Renton, to connect with the Independent system of this city.

SPOKANE, WASH.—The Interstate Telephone Company will build an Independent toll line from Coeur d'Alene, Idaho, to Spokane, Wash.

MORGANTOWN, W. VA.—The Consolidated Telephone Co. is building a line from Fairmont to Morgantown.

CITY OF MEXICO, MEXICO.—The Mexican government has ordered the construction of about 1,953 kilometers of telegraph lines between the City of Mexico and Pueblo. The wires will be placed upon iron poles, 3,000 of which will be required for the purpose. The work will be done under the direction of Eng. Camilo Gonzalez, director general of Federal telegraphs.

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CENTURY
100% GOOD

MAGNETO DESK TELEPHONE

Desk telephones are generally a source of trouble. This is mostly due to incorrect design and poor construction.

Our No. 65 Magneto Desk Telephone is well designed and perfectly made.

It is made of hard brass—no castings excepting inside base piece.

There are no weak parts which are liable to break.

This desk stand will stand hard usage better than any other made.

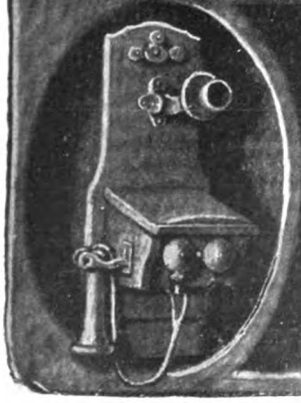
The hook switch can be examined without the removal of any screws. No small parts to lose.

All connections are soldered and never give any trouble.

This Desk Telephone is, without a doubt, the neatest in appearance and most efficient in operation.

We will send you one or two Desk Telephones, complete, or stand only with transmitter and receiver, on 60 days' trial, charges prepaid.

A trial will convince you of their superiority.



CENTURY TELEPHONE CONSTRUCTION CO.
332 ELLICOTT STREET
BUFFALO, N.Y.

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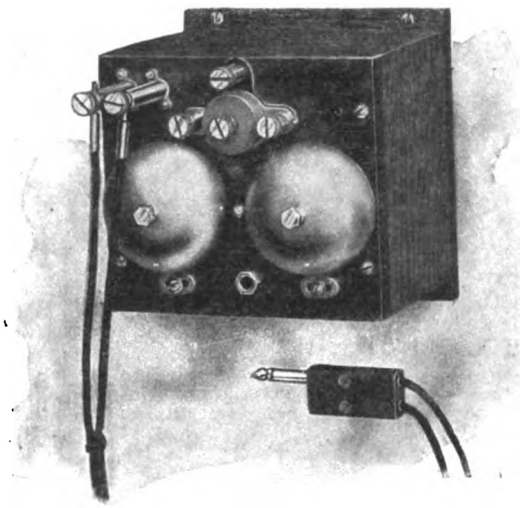
MONARCH APPARATUS

SECTIONAL TOLL LINE SWITCHBOARD



A simple, convenient device for connecting toll or farmer lines.

Each line terminates in a box as shown in the illustration.

A regular bridging telephone with a cord and plug attached is used as an operator's set.

The connections are made with the cords and plugs attached to the sectional boxes.

A clearing-out signal is always left on the line.

As many as ten or twelve sections can be mounted side by side and conveniently operated.

The device is simple and practical. The cost is moderate.

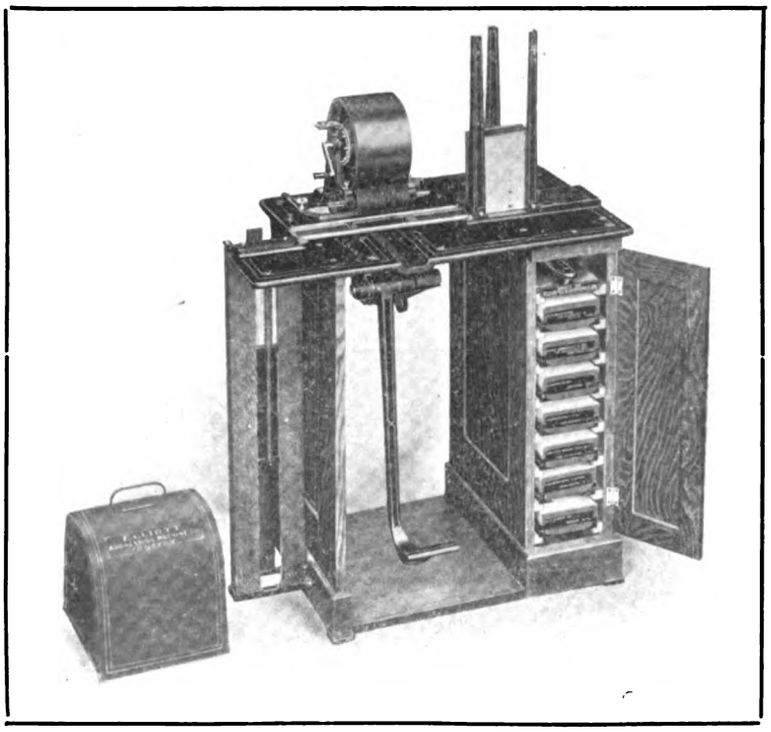
Prices and further description on request.

MONARCH TELEPHONE MFG. CO.

10-16 SO. CLINTON STREET CHICAGO, U. S. A.

STUB BILLING IN PILES IS POSSIBLE

ON THE ELLIOTT ADDRESSING MACHINE



Which prints from above and changes every second. The Form of Bill to be addressed is indicated by the Various Stencil Colors, visible Before, While and After Printing.

The OFFICE STENCIL CUTTER

Completes the Plant, and puts the entire system under your own control. Accurate, Rapid, Economical, Distinctive, facilitating the handling on every piece addressed.

ELLIOTT ADDRESSING MACHINE COMPANY

H. C. NICKERSON, President

101 PURCHASE ST., BOSTON, MASS.

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DEAN TELEPHONE APPARATUS

COMMON BATTERY APPARATUS

Examine your "junk pile" and see if it is not the depreciation of the wood case of your telephones that has made them unfit for use. You will then be open for conviction. Our stamped steel case instruments with baked enamel finish that is practically indestructible, are proof against this depreciation—*They will stand up indefinitely.* If the enamel gets dirty, wipe it off and you have a finish as good as new.

We show our common battery steel box telephone in the above illustration. It has full sized, full efficiency apparatus, yet is extremely compact. The circuit is our Wheatstone bridge type, the simplest and best to be had.

They are adapted for all kinds of exchange work—residences, hotels, or business houses.

Prices are very reasonable.

HARMONIC CONVERTER

THE DEAN ELECTRIC COMPANY
ELYRIA · OHIO

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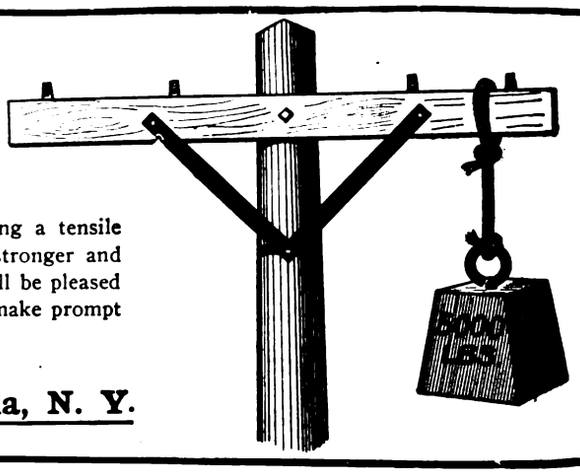
CROSS ARM BRACES

PLAIN AND GALVANIZED

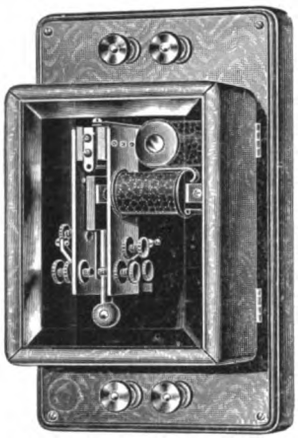


Our braces are made from best quality Bessemer steel, showing a tensile strength twice that of soft steel or iron, thereby securing a much stronger and better brace at no additional cost. Send us your inquiries and we will be pleased to quote best prices, either plain or galvanized. Are in position to make prompt deliveries.

BUFFALO STEEL CO., Tonawanda, N. Y.

SIMPLICITY
is the Keynote of Success

A simple device which accomplishes the same results as a more complex one is certainly more preferable. The Sandwich Pole-Changer is the simplest device ever constructed for ringing purposes. There are but three contact springs and as these engage alternately with their opposite sides they cannot be forced out of position by constant use.



It requires no adjustment, as this is done at the factory and is permanent.

The use of a primary constant current battery to operate the vibrator has been dispensed with; a minute quantity of current, hardly a milliampere, being taken from the ringing battery, through suitable resistance coils for this purpose.

It will work in either a vertical or horizontal position, which permits it being hung on a wall or mounted on a cabinet. Another excellent feature is that it is practically noiseless. There are others which are described in our free booklet. Let us send it to you.

THE SANDWICH POLE-CHANGER CO.
400 EDDY STREET, SANDWICH, ILL.

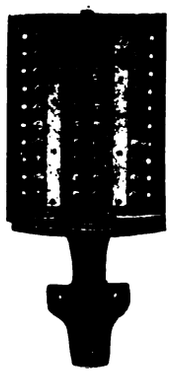
THINK OF ME

Every time you use or buy telephone construction iron, remember I am the maker of the "BULL TONGUE" Land Anchor, and also sell everything else in telephone construction iron.

My Anchor is the best and cheapest made. It is easier and quicker to instal, and holds better than any made.

Write for my book.

I. A. BENNETT
CHICAGO
141 South Clinton Street



SIDE BRACKET.

Patented.

TYPE A—10-Pair Hall Cable Box.

A CABLE TERMINAL OF MERIT

If you use aerial cable, you undoubtedly use the multiple tap system of distribution by means of cable terminals.

THE HALL CABLE TERMINAL is representative of what a cable terminal should be. It was designed by an expert; and from practical as well as theoretical standpoints, is unexcelled. It affords ample protection against lightning and sneak or heavy currents. Plenty of room is provided to make connections, and yet the device is compact.

For side bracket use it is made in varying capacities from 10 to 50 pairs, and for pole tops in sizes from 25 to 100 pairs. If you have seen it, you are using it. If not, then you had better send for a sample before placing your order elsewhere.

SOLE MANUFACTURERS
THE MOUNTAIN STATE ELECTRICAL CO., WHEELING, W. Va.

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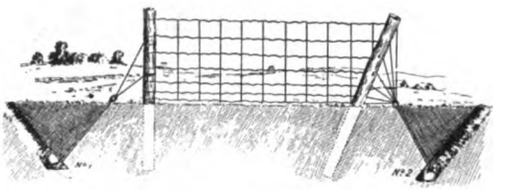
Wesco Supply Co..... —
Western Steel Gate Co..... —
Weston Electrical Instrument Co.. 38
Willyoung & Gibson Co..... 32
Wilson, J. I. M..... 37
Wire & Telephone Co. of America. 1

"Hercules" Anchors

MADE OF MALLEABLE IRON



"HERCULES" Anchors are easy set.

"HERCULES" Anchors pull against solid earth.

"HERCULES" Anchors are strongest made.

"HERCULES" Anchors will not creep.

Send for Prices and Circulars

The W. G. Nagel Electric Co.

28-32 ST. CLAIR ST. TOLEDO, O.

800 PAY STATIONS IN ONE ORDER

New Model Pay-station 1 to 5 Slot.

We received this order Nov. 1st, from one of our customers who has used them for years, and bought 900 last month.

IF IT PAYS THEM IT WILL PAY YOU

Write for catalogue and prices or let us send you one on trial.

Baird Manufacturing Co.

No. 6 Michigan Street

CHICAGO - - - - - U. S. A.

The V-B Express Drop and Jack

ITS ADVANTAGES

¶ It has a coiled spring restoring device, absolutely positive, simple, always in adjustment.
¶ The coil, wound on cardboard tube, may be removed without disturbing the magnetic adjustment—the core being rigidly fastened to the shell—by just a turn of the hand.
¶ The armature, maintained by special bayonet catches, in the same relative position to the shell and core, is as easily removed and replaced.
¶ The drop is most delicately sensitive, responsive to the slightest current.
¶ One side of the night bell circuit is attached to the frame of the drop (made possible by the heavy insulation of cardboard) thus simplifying the possible chances of trouble.
¶ The slides are so arranged as to make the drop perfectly dustproof, an essential factor with a cut-off jack.
¶ The springs are fastened to the end of the brass mounting plate, which in turn is fastened to the drop shell at both ends, making an absolutely rigid construction throughout.
¶ The night-bell contact is platinum to platinum, made by the weight of the shutter supporter on a short leverage, positive in action.
¶ The mounting device allows the drops to be mounted singly.
¶ The drops are made with accurately built tools and dies, so that all parts are interchangeable.
¶ We shall be glad of the opportunity to send a sample drop, and to write in further detail.

The Vought-Berger Company

Makers of First-Award Telephones and Switchboards

LA CROSSE, WIS.

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THE

Kellogg Switchboard & Supply Co.'s

FOUR PARTY LINE PATENT

Issued January 10, 1905, No. 779,533,

Does not cover ALL selective ringing systems, as many such systems embody features that this patent does not contain.

For example, the Leich four party line system, patented subsequent to the Kellogg system, September 5, 1905, has two bells legged to ground from each line conductor and uses the earth as a common return for the ringing current. (See Fig. 5, Leich patent.) The Kellogg patent covers broadly such a system, having A METALLIC RINGING CIRCUIT and without grounds at the sub-station.

Again, the Leich system does not employ a harmonic or tuned sub-station outfit. (See Leich patent, page 4, lines 25 to 33). The Kellogg patent covers broadly a system using HARMONIC OR TUNED RINGERS at the sub-stations, adapted to be selectively operated by alternating currents of corresponding frequencies.

Again, the system OF THE LEICH PATENT does not selectively operate the bells by means of "high-and-low-frequency or different-frequency" ringing currents, but operates ALL the bells by current having the SAME frequency but of a different ELECTRICAL CHARACTER. (See Leich patent, page 4, lines 16 to 24.) A two-frequency system is being placed upon the market as the "Leich system," but this system or any other system employing DIFFERENT FREQUENCIES for operating the bells, IS NOT COVERED BY THE LEICH PATENT. The Kellogg patent covers broadly a system in which the different tuned ringers are selected by means of alternating currents of DIFFERENT FREQUENCIES.

The Kellogg patent covers broadly ALL systems that are METALLIC, HARMONIC, AND USE HIGH AND LOW FREQUENCY CURRENTS, and all systems using these features ARE INFRINGEMENTS OF THE KELLOGG PATENT, AND WILL BE PROSECUTED.

Copies of the Kellogg patent or any other four party line patent will be furnished upon request.

Kellogg Switchboard and Supply Co.

CHICAGO, ILL.

BRANCH OFFICES

PHILADELPHIA, PA.	CLEVELAND, O.	NEW YORK, N. Y.	LOS ANGELES, CAL.
Keystone Bldg.	Electric Bldg.	116 Nassau St.	Seymour Bldg.

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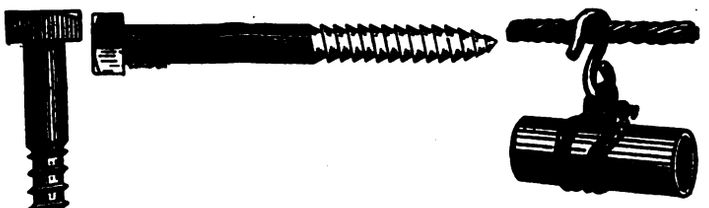


Get on the Wire, Mr. Buyer, the Schaper Construction Material Co. wishes to talk to you!

This is what the Schaper man said:

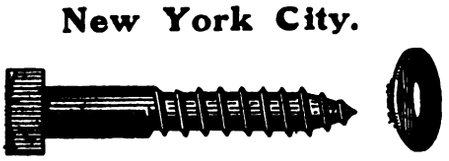
"We understand you are in the market for construction material and we take it for granted that you will need the best. We are in an unexcellent position to furnish you with the highest grade of line hardware that it is possible to buy. You are undoubtedly aware that there are different grades of iron, some suitable for one purpose, some for another. Without going into a technical description, although if you so desire, we will be pleased to take the matter up by letter, we wish to state that each article we have for sale is made from the grade of iron best suited for its use. Another point of vital importance to you is the one of shipment. Our stock is so extensive and varied that we are able to fill almost any order within a few hours after its receipt. Our transportation facilities are excellent and we can guarantee you quick deliveries. * * * * Thanks, we shall be only too pleased to estimate. By the way, we will send you a supply of estimate blanks: they will help you to determine your exact needs. * * * * Yes, we handle everything needed: wire, braces, lag screws, cable hangers, etc. * * * * Yes, indeed I will give your order my personal attention. * * * * Good bye."

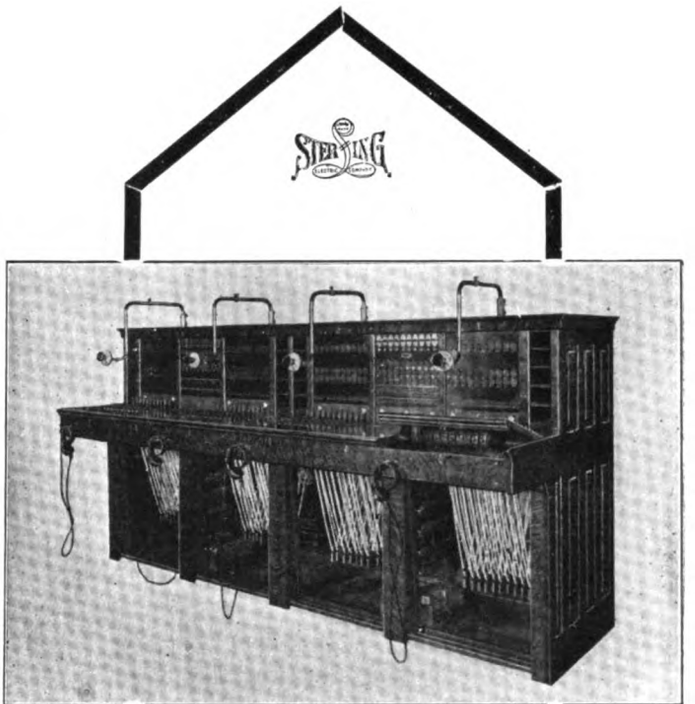
When the salesman reported to the head of the firm, he said: "Mr. Buyer of the Good Telephone Company will place his order direct with us without trying elsewhere. He has confidence in our statements and in our goods."

Mr. Reader, have you?

The Schaper Construction Material Co.

ELECTRICAL EXCHANGE BLDG.,
136 Liberty St.,
New York City.

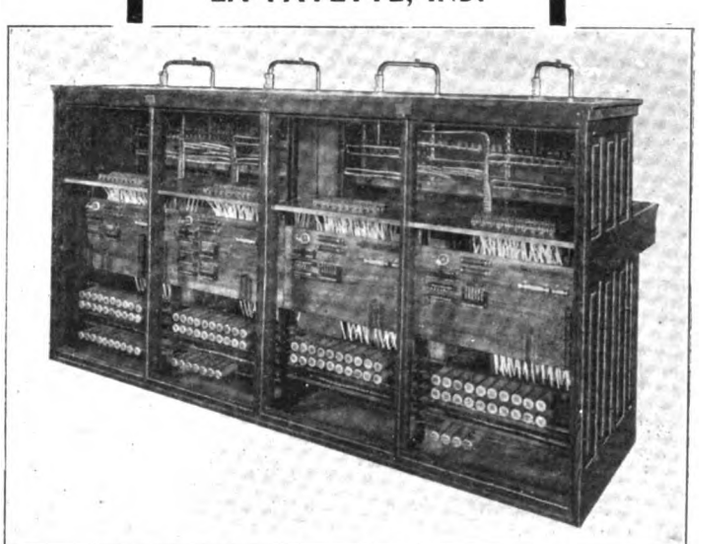




COMMON BATTERY
LAMP SIGNAL
MULTIPLE SWITCHBOARDS

The Only
TRUE COMMON BATTERY
Circuit
BUILT FOR ALL USES

STERLING ELECTRIC CO.
LA FAYETTE, IND.



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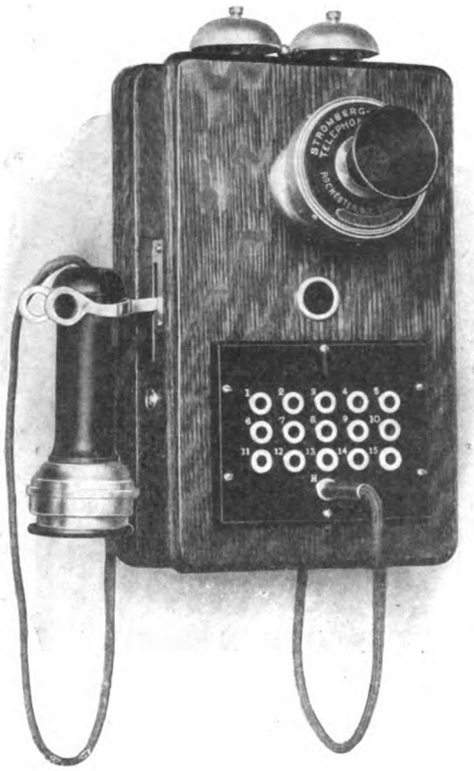
STROMBERG-CARLSON PRIVATE TELEPHONE SYSTEMS

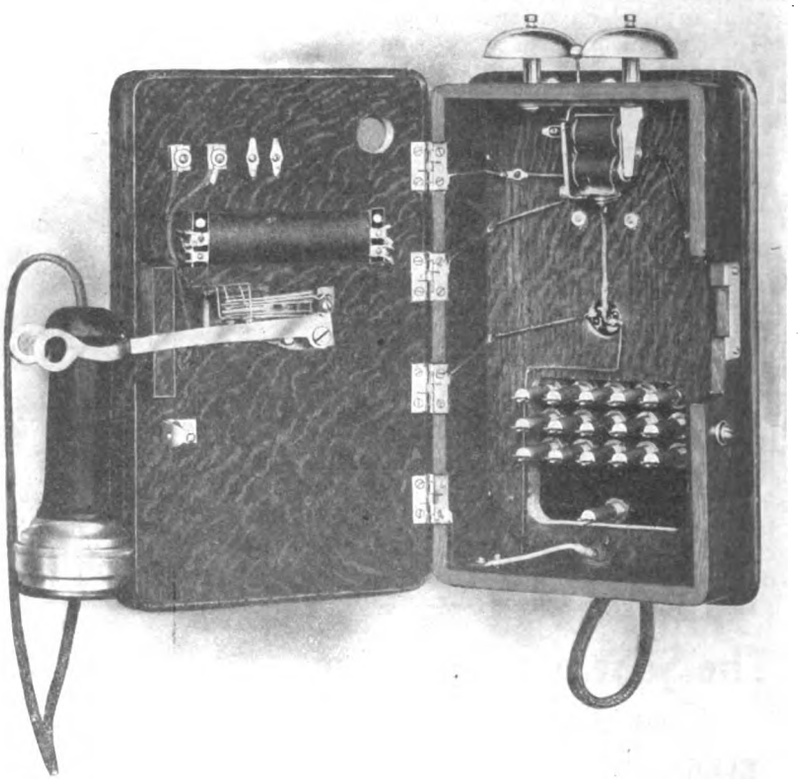


Do you think you have fully developed your Private Branch exchange field?

If you have not done anything with the Intercommunicating telephone system, you are neglecting a good field. One of our customers has connected nearly 100 of these systems to his exchange in less than two years, to say nothing of the regular Private Branch exchanges. Let us give you the benefit of our experience, gained in helping our customers do this.

There's nothing for you to lose and it would be remarkable if we could not help you some.

This is our standard Intercommunicating wall telephone. It is made up of standard telephone parts—long distance transmitter and receiver, platinum contact, hookswitch, etc., and has a capacity for 25 lines and one home jack. Each instrument is provided with an adjustable transmitter arm. We have several styles of desk and combination telephones, all of which are described in our Bulletin No. 13 B. Any telephone man will find the information in this bulletin valuable. We mail it free.



Stromberg-Carlson Telephone Manufacturing Company

ROCHESTER, N. Y. CHICAGO, ILL.

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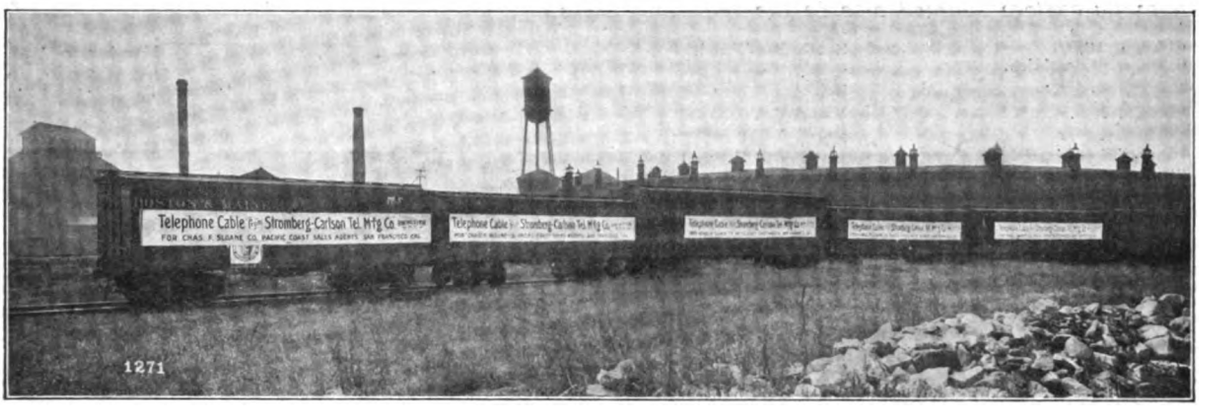
WE MAKE CABLE

Our cable manufacturing and shipping facilities enable us to ship in car load or train load lots whichever you prefer. Below we show five car loads of cable en route to the Pacific Coast.



Shipments of this size, to the East and Middle West, are getting to be almost a daily occurrence with us now.

Small orders are given the same consideration and tested as carefully as the big ones. Any telephone man interested in cable of the ***highest*** quality would do well to get our cable book. It tells how Stromberg-Carlson cable is made.

Just ask for booklet No. 79-B.

STROMBERG-CARLSON TELEPHONE MFG'CO.
ROCHESTER., N.Y. CHICAGO., ILL.

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19,300 AUTOMATIC LINES

INSTALLED

IN LOS ANGELES, CALIFORNIA

by us in the past two years for the HOME TELEPHONE & TELEGRAPH COMPANY. These are divided among eight branch exchanges (all in Los Angeles), as follows:

Grand Avenue Station.....	5,000	individual lines.	Garvanza Station	400	individual lines.
East Los Angeles Station....	1,000	" "	Prospect Park Station.....	500	" "
Boyle Heights Station.....	800	" "	West 7th Street Station.....	4,000	" "
Vernon Avenue Station.....	600	" "	Olive Street Station.....	7,000	" "
Total.....				19,300	

Our automatic system adopted also in the following cities:

Chicago, Ill.
Grand Rapids, Mich.
Columbus, Ohio.
Dayton, Ohio.
Lincoln, Neb.
Portland, Me.
Auburn, N. Y.
Lewiston, Me.
Sioux City, Ia.
Cleburne, Tex.
Columbus, Ga.
South Bend, Ind.
Aberdeen, So. Dak.
Miamisburg, Ohio.
Portland, Ore.
Van Wert, Ohio.
Battle Creek, Mich.
Clayton, Mo.
Pentwater, Mich.
Toronto Jct., Can.
Wilmington, Del.
Albuquerque, N. M.
Traverse City, Mich.
Auburn, Me.
Fall River, Mass.
New Bedford, Mass.
Medford, Wis.
San Diego, Calif.
Hopkinsville, Ky.
Hazleton, Pa.
Woodstock, N. B.
St. Marys, Ohio.
Westerly, R. I.
Manchester, Ia.
Princeton, N. J.
Riverside, Calif.
Allentown, Pa.
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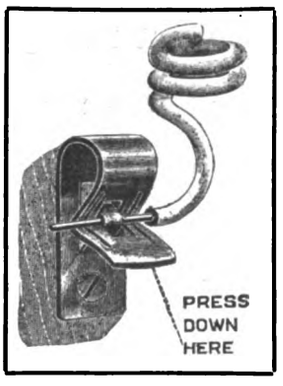

FAHNESTOCK SPRING BINDING POST

is substituted for the regular type screw post, these troubles will not ocur. The wire is held under an even spring tension which never varies, thus preventing it from working loose, and hindering the entrance of dirt or moisture between the contact surfaces of post or wire. It is the latter trouble which causes corrosion. A transmitter is designed to work with a certain amount of current. If it does not receive the right amount its efficiency is lessened. By ordering the Fahnestock post upon your batteries you will be certain that no losses will occur through poor contacts at this point. Samples free.

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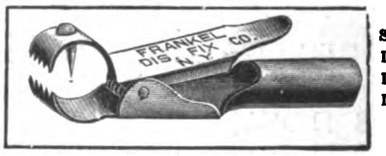

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GET out of that rut of skinning the wires—IT'S EXPENSIVE.
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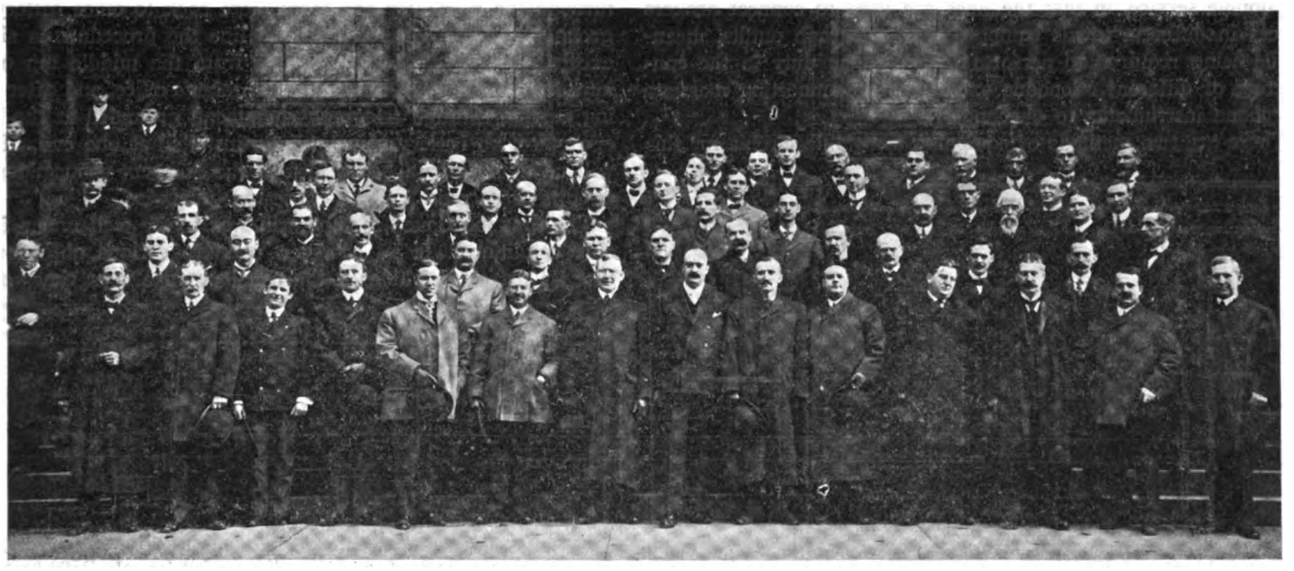
The Pittsburg Convention of the Pennsylvania Association

By W. L. Ross.

THE representatives of the fifty Independent telephone companies of Pennsylvania who left the banquet hall of the Monongahela House, Pittsburg, late in the evening of Nov. 10, were unanimous in their declaration that the Pittsburg convention of the Pennsylvania Independent Telephone Association had done much to weld the Independents into one compact body. They returned to their homes to continue their work the more energetically, with the evidence they had seen with their own eyes of the big success which the Pittsburg & Allegheny Telephone Company had achieved in a Bell stronghold.

This meeting was the second in the history of the association, which is only a year old. The convention opened Thursday at 10 a. m., and sessions were held that morning, in the afternoon and the next morning. Friday afternoon was set apart for a closer inspection of the many manufacturers' exhibits which were grouped on the parlor floor of the hotel. Many of the members also took advantage of that period to visit the Main and other exchanges of the "P. & A."



Delegates to the Pittsburg Convention of the Pennsylvania State Independent Telephone Association.

One act of particular interest to Western Pennsylvania Independents was accomplished by unanimous vote. This was the passing of a resolution in strong condemnation of the Federal Telephone Company of Pittsburg, which is not to be confused with the important Ohio Independent company of the same name. The matter was brought up by a recital at the Friday morning session of the situation in Washington county, where the Federal is manipulating a huge bluff in connection with an Independent exchange at Claysville, circularizing its subscribers for the alleged purpose of securing evidence that the P. & A. is refusing to give the service the law requires. President J. G. Splane, of the P. & A., spoke briefly on the subject. The outcome of the discussion was the adoption of the following resolution offered by General Manager C. E. Wilson, of the Keystone Telephone Company, of Philadelphia: "It is resolved by the members of the Pennsylvania State Independent Telephone Association, assembled in convention at Pittsburg, that the Federal Telephone Company, by their acts and deeds in every respect relating to Independent telephone companies, have proven to our entire satisfaction, beyond the possibility of doubt in our minds, that they are allied, directly or indirectly, with the Bell company, and that their operations have tended to impede rather than assist in the development of the Independent interests. This resolution refers to the company which is controlled by Mr. Fred DeLand and associates."

The Thursday morning session was devoted to a meeting of the executive committee. After the discussion of a number of routine association matters the following committees were named to serve for the convention: Nominations—C. E. Wilson, Charles West, J. G. Splane; credentials, Charles Berg, Frank Hart, S. G. Latta; resolutions on death of First Vice President, W. D. Barnard, of Philadelphia; John S. Weller, Charles Russell, E. D. Schade; programme, Frank Hart, C. E. Wilson and H. E. Bradley.

When the association met in the afternoon Second Vice-President Charles Griffith was in the chair. Assistant City Solicitor John A. Blair, of Pittsburg, delivered the address of welcome, to which the response was made by Hon. John S. Weller, vice-president and general counsel of the P. & A. Secretary H. E. Bradley read his annual report, which showed that there are fifty fully organized Independent telephone companies in Pennsylvania, and that all of these are allied with the association. There are in addition thirty-three concerns not fully organized and many of them very small. Probably the majority are farmers' lines. The Independents of Pennsylvania allied with the association operate 75,899 telephones and have 71,142 miles of toll circuits covering

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practically the entire state. For the purposes of the association the state has been divided into five districts and the traffic committee which has charge of the work of unifying the operation of the many companies reported very good progress.

The resolutions on the death of W. D. Barnard, of Philadelphia, the late first vice-president of the association, were reported by the committee and adopted. Officers for the ensuing year were elected as follows: President, ex-Senator C. W. Kline, of Hazelton, president of the Consolidated Telephone Company of Pennsylvania; first vice-president, Charles Griffith, president of the Johnstown Telephone Company; second vice-president, James Collins Jones, of the Keystone Telephone Company, Philadelphia; secretary, H. E. Bradley, of Philadelphia, the former secretary of the association, who is also secretary of the Eastern Traffic Association; treasurer, C. E. Wilson, general manager of the Keystone; executive committee, Edward Davis, Philadelphia; Judge R. E. Umbel, Uniontown; William B. Trask, Erie; F. D. Houck, Harrisburg; Charles West, Allentown; E. D. Schade, Johnstown; G. B. Rudy, York, and J. G. Splane, Pittsburg.

Charles West, of Allentown, general manager of the Consolidated Telephone Company of Pennsylvania, read an able paper on "The Future of the Independent Telephone Movement," which was followed by a prolonged discussion.

The banquet, which ended the convention, was attended by over 150 members and guests. The convention had attracted, in addition to its members, many guests from other states, including New York, Ohio, West Virginia, Maryland, Indiana, Illinois, Missouri and Kentucky. Vice-president Weller, of the P. & A., presided as toastmaster, and speeches were made by M. C. Watson, former president of the Indiana Telephone Company, of Indiana County, Pa.; J. W. Beers, general manager of the Home Telephone Company, of Ft. Wayne, Ind.; N. W. Brooker, Jr., contract agent of the P. & A.; Messrs. Handlan and Barnes, of the National Telephone Company, of Wheeling, W. Va.; William L. Hurd, president of the Monongahela Tube Company, of Pittsburg, and several other representative Independent leaders.

Simplex Circuits

By H. G. Greenwald.

THE term "simplex circuit" is applied to indicate the arrangement of a metallic telephone circuit, with the necessary additional equipment, in such a manner as to allow the transmission of telegraph signals, without, in an appreciable degree, impairing the value of the circuit for telephone service. Quite a number of Independent telephone companies are greatly increasing the earning capacity of their toll lines by making them do double service, in that the lines are used to connect brokers offices in different towns equipped with telegraph outfits, meanwhile being required to perform their regular duty in the connecting of different telephone exchanges or connecting magneto telephone instruments to exchanges.

There are two methods of equipping a metallic circuit for this

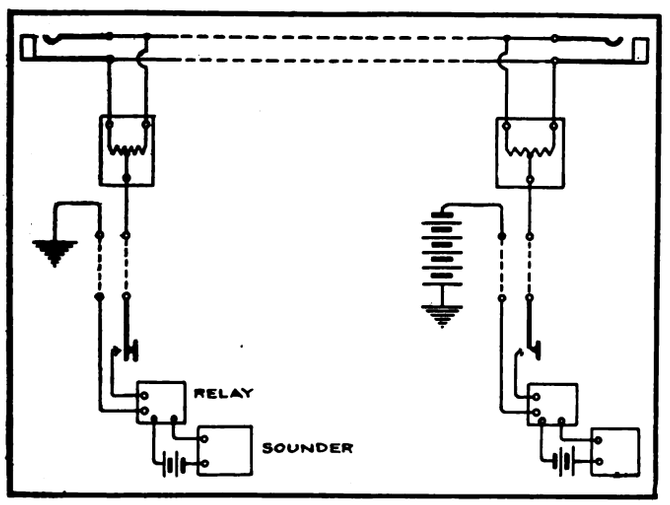

Fig. 1. Telegraph instruments connected to telephone line through impedance coils.

duty. One is with the use of impedance coils, as per Fig. 1; the other making use of a certain type of repeating coil, as per Fig. 2. In the first method impedance coils are bridged across the line at the convenient places of attachment in the different telephone exchanges. The impedance coils are of peculiar construction. The wire is wound around a soft iron wire core in a continuous direction. In the middle of the length of wire a connection is made and extended to a suitable binding post or lug. The point of this connection must be so placed and the coil wound in such a manner as to allow the amount of wire on both sides of the middle tap to have the same number of turns and also the same resistance; otherwise the coils will not be in balance as regards both the resistance and the inductance, and therefore not available for the desired use. Almost any telephone factory or switchboard manufacturing company will essay to produce these coils, some of them carrying them in stock for this very use. From the middle point of one of the coils attached to and placed across the line in one telephone exchange, a single wire is usually run to one terminal of a pair of wires leading to the broker's establishment; there it is wired through a telegraph relay, then through the usual key and from there back to office battery and ground. At the other end of the line the procedure is similar except, of course, the single wire from the middle tap of the impedance coil is run direct to the broker's office, and after leading current through telegraph equipment, grounded at the broker's office, no battery being usually installed at one end. Fig. 1 will no doubt give a better idea of the different connections and circuits than could well be expressed otherwise.

The first mentioned method will work very well under favorable conditions. It is, however, open to serious objections in that its perfect working in the usual practise is at times apt to

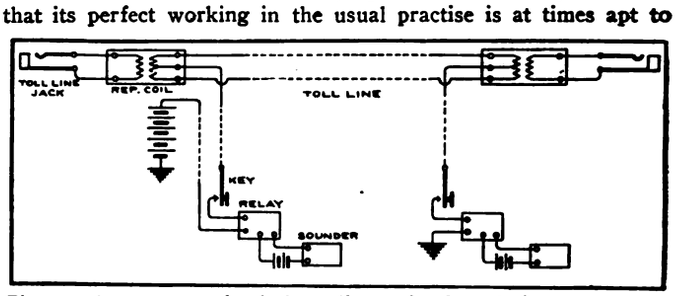

Fig. 2. Arrangement of telephone line and telegraph instrument, with repeating coil, to form connections of simplex circuit.

be impaired. Should the switchboard operator at either end connect the toll line to a local or another toll line having a ground on one or both sides, unless she used a cord circuit containing a repeating coil or condensers, the equipment at the broker's office at one of the ends would be partially short circuited or perhaps completely so; or should a toll line carrying a telegraph circuit be connected with a similarly equipped line, unless the two plugs were separated by condensers or repeating coils, the two telegraph circuits would interfere with one another. Again, many exchanges, on account of selective ringing, have one terminal of the ringing current generator permanently grounded or at least grounded when about to ring. Thus should an operator at an exchange so equipped ring on the toll line or trunk equipped for simplex work, the ringing current would flow through the telegraph relays to ground, producing a fluttering racket by no means pleasing to the ear of the telegraph operator. Even should the ringing generator not be permanently grounded, should another operator be ringing to ground on another circuit while toll

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operator was ringing on the simplex circuit, the same effect would be experienced. The disturbance due to ringing current can be avoided by placing a transformer or "ring through" repeating coil between the generator and the ringing key. This will usually shield the circuit from the ground, but unless additional keys are used, the transformer places an appreciable constant load on the output of the generator. To avoid the nuisance incurred by connecting with accidentally grounded lines it would be practically necessary to have repeating coils in all cord circuits used in connection with cords placed in the simplex line jack. In fact, to protect this first scheme from disturbing influences it is usually found necessary to employ repeating coils in different and numerous parts of the exchange equipment, which is undesirable from several view points.

Usually it is found best and cheapest to employ a combination of the impedance coil and repeating coil in the telephone-telegraph line rather than use repeating coils in the cord circuit and

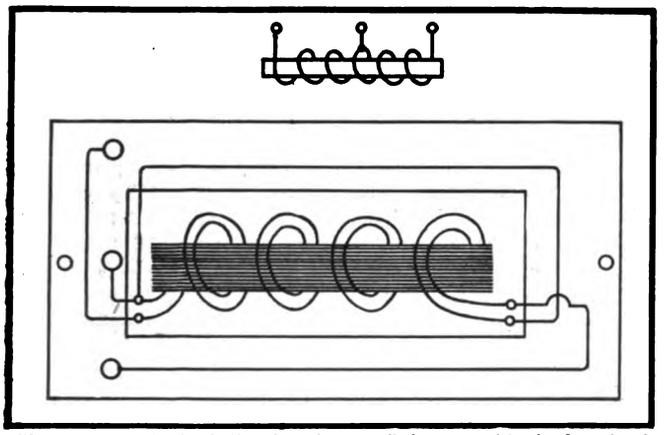

Fig. 3. Method of winding impedance coil for use with simplex circuit.

in the ringing circuit, this being the idea utilized in the second method. As may be noted on observing Fig. 2 a special form of repeating coil is placed at each exchange between the switchboard and the line terminal on the cross-connecting frame. One side of this "simplex coil" is wound around the soft iron wire core usually, in special made coils, without the middle point brought out, while the other half or the "secondary" of the coil has the middle or neutral point brought out to the lug or binding post; this latter winding performing the operation of the impedance coil used in the first method, as well as acting in its capacity as "secondary" to the other half or "primary" of the equally wound repeating coil. The switchboard drop and jack are connected to the side of the repeating coil not having tap brought out, or if brought out, not intended to be used. The toll line terminals on the cross connecting frame are connected to the other side of the repeating coil; the middle point of this latter winding, as does the middle point of the impedance coil in the first plan, connects with one terminal of the pair of wires leading to the sub-station where the telegraph equipment is used. It is needless to say, the repeating coils should be as efficient as can be procured, as on account of there being two coils permanently in the line, voice currents are liable to lose considerable of their long distance qualities, mainly volume. On short distances, hardly any loss of volume will be noticed, and due to the quiet line produced, transmission may appear even to have been benefited, at least such was the impression received by the writer during experiments on different simplex equipments.

It may be well to note the directions of flow of both the telegraph and the telephone currents through the impedance coils in the first plan, or the winding, acting both as one side of the repeating coil and as an impedance coil, in the second plan. Telephone currents flow out one wire of the metallic circuit and return on the other wire to its source, which may be regarded either as the telephone in one plan or the repeating coil in the other. Telegraph current enters the middle point of the impedance coil or winding, flows in opposite directions around the core, producing no inductance, flows over both line wires in parallel, traverses the impedance coil at the other end, again producing no inductance, goes through telegraph instruments to ground, through which it returns to battery from whose other terminal began the circuit. Very little of the high frequency telephone current will escape from the outside terminals of the impedance coils, or windings serving as such, to the middle point of same or to the opposite terminals, so as to become lost through access to the ground or the other side of the line, as the direction of winding is not changed either while passing the point where tap has been taken off or at any point in the winding; also as the parts of the winding on both sides of the tap are equal as regards inductive capacity and resistance the circuit will not be so unbalanced as to render the line noisy. The arrangement is similar to the scheme used in the wheatstone bridge. Fig. 3 is intended to indicate the result of a scheme of winding impedance coil or winding of "simplex coil" so as to obtain a "balanced" coil. In this scheme two parallel wires are wound on the spool enclosing the core. One of the two ends nearest the core is connected to the outside end of the other half of the winding and also extended to connect to the lug marked "neutral." The two remaining ends are connected to the outside posts. In case a repeating coil is to be made another winding is placed on top of this with or without the middle or neutral point brought out, as may be desired. Precaution should always be exercised in the installation of these coils so as to have them placed between the switchboard and proper lightning protection—never between the line and the protection.

In the use of battery there is some choice. Some companies use a small type of storage cell for this purpose. On broker's circuits the discharge is small, besides being of intermittent flow on account of the telegraph impulses. Brokers' hours are usually from 9 a. m. to 4:30 p. m. During the night it is usual to either allow the telegraph keys to remain open or to open the circuit by means of a switch in the telephone exchange. The resistance of the winding of the impedance coils or repeating coils is about forty or fifty ohms. Since for telegraph service these windings are used in parallel the resistance of each coil is perhaps twenty-five ohms. Two coils in series with the two sides of the toll line in parallel and the two one-hundred-fifty ohm telegraph relays

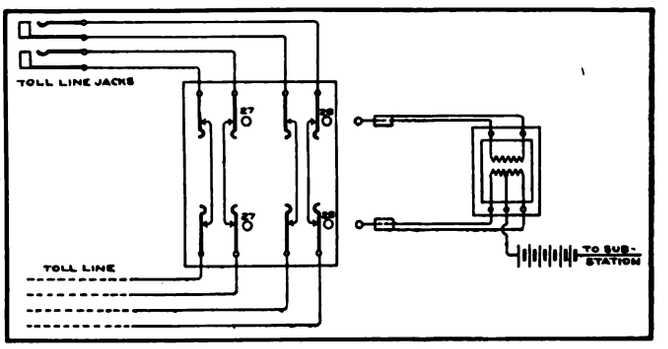

Fig. 4. Arrangement for connecting repeating coil and telegraph instruments to line through jack box.

would make the resistance of the complete circuit about six hundred ohms. If thirty volts battery pressure were used there would be only a discharge of about fifty one-thousandths of an ampere, it having been found in practice good results are obtained with a current strength between 45 and 55 milliamperes. Owing to this low discharge very small cells of storage battery are used; it is necessary to charge about once a week; also a series of dry batteries may be used in case some type of close circuit cell cannot be procured. If storage batteries cannot be used it would be best to use Edison-Lalande, gravity, Gordon or other type of cell which does not polarize readily. Sometimes it becomes necessary to use considerably higher potential due to variable differences of pressure between two towns, disturbing the line, this being especially true where trolley lines connect the two towns under consideration.

It may often happen that a toll line will become grounded or

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break down. Should the line be equipped for simplex work, the telegraph circuit is either disturbed or put out of working order.

Attention is drawn to the fact that a short circuit or an open wire in a composite circuit will not seriously affect its use telegraphically; in case one side of the line grounds or becomes opened, this side may be cut out, and the Morse operated on the remaining good side. The only trouble which will cut out the Morse will be either both sides open or both sides grounded. Usually it is even more important to have the telegraph circuit re-established as soon as possible, than the telephonic service. To facilitate the restoring of the telegraph communication it may be found useful to install at both ends of the circuit a jack box so arranged that should one circuit be in trouble the telegraph equipment may be readily made to work on a possible parallel pair of wires. Should there be but one pair of wires available this device cannot be used. The jack boxes are so arranged, that should plugs not be in jacks the circuit is cut direct through from line to switchboard; if plugs are in position the circuit includes the impedance or repeating coil, as shown in Fig. 4. It is a good plan to have one of the plugs marked in some way and the operator given instructions as to the proper manner of inserting the plugs, otherwise she is liable to place the "tailed side" toward the switchboard instead of towards the line when repeating coils are used. Should she be accustomed to placing the plugs one directly below the other and the marked plug at the bottom, there should be no likelihood of the plugs being improperly placed at either end.

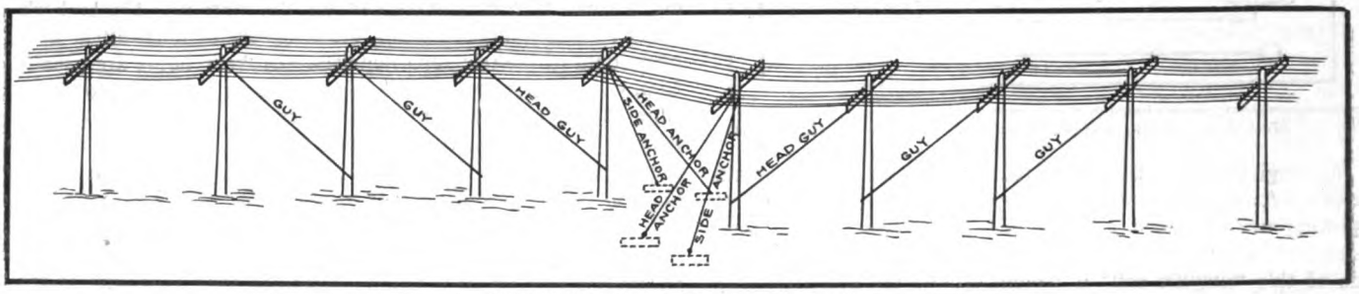
(To be continued.)

Construction for Crossing a Street

By Martin Van Buren.

IN all line construction it is very desirable to do good work. This is substantial and will prove to be a good investment.

All material should be of the highest quality. Poles should have tops not less than eight inches in diameter and good, heavy butts. They should be reasonably straight and live and sound throughout the entire length. For toll line work the use of poles less than thirty feet in length is hardly advisable. Poles on straight lines should be set into the ground five feet, and those on corners should be set six feet. The earth should be thoroughly and constantly tamped in as the hole is being filled. It is well to have one man fill while two or three tamp, making thorough work.



Method of guying poles for street crossing.

On corners poles should be of extra size. On a road crossing the cross-arms on corner poles should face each other. It is a good practice to cut the arm to the angle of the corner, and have the first three arms on each line face the corner. With this method the head guys will pull against the arms. Wherever it is possible a head guy should be set five inches away from each pole for every foot in the height of the pole. This places the guy at an angle which will give a direct strain. All guy slugs should be at least six feet long, ten inches thick and be buried not less than six feet deep, and the earth above them well tamped. The writer is unable to see any advantage in the use of a double arm for through line work. The greatest fault lies in the stringing of the wire. The average lineman seems to think it necessary to pull the wires up until they sing. As a matter of fact all that is necessary is to have them pulled up far enough so that they rest easily, without undue tension, yet tight enough so that high winds will not swing them too close together. This method will save many trips for repairs during the first winter.

RAPID DEVELOPMENT OF INDEPENDENT SERVICE IN MEXICO.

ABOUT two months ago a telephone company was organized in Celaya, Mexico, with the very modest paid up capital of $2,500.

Immediately after its organization the company made a contract with La Compañia Noruega Mexicana, S. A., of this city, for the installation of an exchange at Celaya. This installation is now finished and it has just been turned over to the telephone company by the contractors, with a total list of fifty-two subscribers on the switchboard.

At a recent general meeting of the shareholders of the company it was agreed that the capital stock of the company should be increased at once to $10,000, fully paid up, on account of the rapid growth of the telephone business in Celaya. It was also decided by the meeting that the company should open an exchange in Irapuato, and contract has been made with the Norwegian company for the installation at that place.

It is said that the company intends to increase its capital still more when the Irapuato exchange is completed, making it $20,000, when it will go over to Guanajuato. Leon will be taken in by the company some time next year, after which will follow Silao and three other towns in the State of Guanajuato, the company gradually increasing its capital to meet the demands that the installations for these places will make upon it.

The company, it is said, is promised all the capital it may require for the proposed improvements and extensions by several of its large stockholders, among those mentioned being Jorge Herbert and Luis Uziabaga. The ultimate object of the company, and one for which it intends to work energetically, is for the connecting of all places of any importance in the State of Guanajuato by telephone and the directors and shareholders are confident that this plan will be realized within a very short time.

This organization in connection with the extensive system centreing in the city of Mexico which is now in process of installation marks a great advance in the southern progress of opposition to the Bell companies. Owing to the methods in which the Bell company has been conducted there is every prospect of success for the Independent companies in Mexico.

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The Simplification of Circuits*

By Frederick T. Johnson.

THIS defect was remedied by the introduction of the retardation coil with four windings into the battery circuit, as shown in Fig. 11. On this circuit windings R R are on one side of the coil, and the windings R' R' upon the other. The condensers C C are introduced in the branches of the line between the windings of the retardation coil, in order to permit the passage of alternating voice currents, while they prevent the

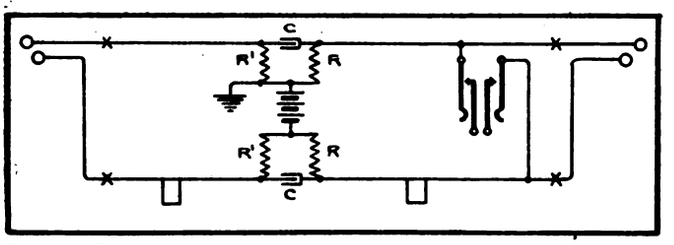

Fig. 11. Basis of common battery circuit using retardation coil with four windings.

shunting effect on the direct battery current, which made the previously shown circuit faulty. It was found, however, in practice, that the use of the condensers C C was not essential with a coil of proper design. With four windings properly proportioned and arranged upon one iron core, the coils in series with one line and the battery, and those in series with the other line and the battery, could be made to act as a transformer, and

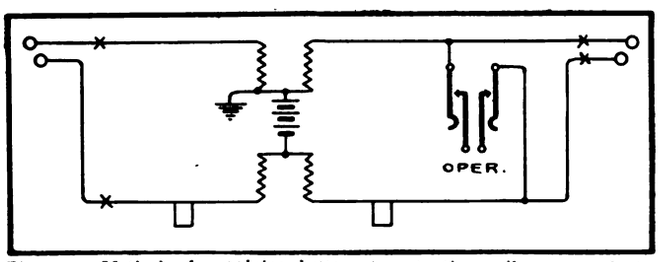

Fig. 12. Method of supplying battery to repeating coil common battery cord circuit.

conversation repeated from one side to the other. This arrangement is the standard at present in use on Bell cord circuits, and is known as a repeating coil cord circuit.

By reference to the diagrams previously published in this article, it will be seen that the various elements which enter into the circuits which are at present chiefly in use in subscribers' switchboards are not large in number, and that each one has come in use as a logical development from the simple circuits used with the earlier telephones, in which two instruments were bridged upon one line. A knowledge of operating conditions and these elements will enable a student to trace out almost any complicated circuit. In case the operation of a circuit is doubtful, and it is necessary to figure out resistances, in order to determine, for instance, whether a lamp is or is not shunted out, or whether the amount of current which passes through a given relay is sufficient to energize the relay, and cause it to attract its armature, a simplification of the circuits, according to the methods outlined above, is frequently of the greatest utility. In Fig. 13 is shown a circuit which will give an example of the method of following out this practice.

This diagram represents a tone test cord circuit, and a subscribers' operator's cord circuit, arranged for connection to different multiple jacks of the same line. Let it be assumed that it is desired to find the joint resistance of all the paths from the sleeve of a multiple jack to ground, when both the cord circuits are plugged into the multiple. One method of doing this is to trace out each path from the sleeve of the jack, checking it off on the drawing, and noting its resistance. In this way figures are obtained which give the separate resistances of all the branches which enter into the circuit. Then those parts which are in multiple, one with another, form circuits of which the joint resistance can be found by the use of the formula $\frac{1}{r} = \frac{1}{r^1} + \frac{1}{r^2} + \frac{1}{r^3} - + \frac{1}{r^n}$, where r equals the joint resistance of the conductors and r^1, r^2, $r^3 - r^n$ equal the respective resistances of the individual branches. This method, if carefully and correctly followed, will give the desired result. It is, however, open to several practical objections. While it is satisfactory on a simple circuit, it becomes very difficult to see the true relations of the different branches of a complicated circuit when it is drawn up in the manner best arranged for a guide to the wireman. The result is that errors are extremely likely to creep into the calculations. Moreover, if doubt is felt as to the correctness of the result each subsequent checking takes practically as long a time as did the original derivation of the figures, so that the method in addition to being complicated, and liable to lead to the commission of errors, is very slow.

It is believed that a much more satisfactory way of obtaining the desired information is by a combination of the graphical methods of circuit simplification and the ordinary arithmetical rules for obtaining resistances of circuits in series and in multiple. As in this particular case the only elements which are to be considered are those involved in the signalling circuits, all those parts

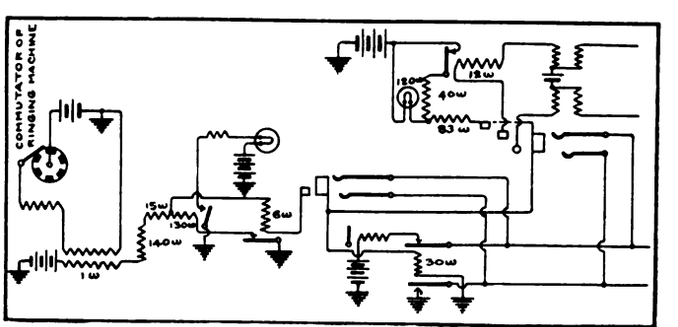

Fig. 13. Tone test cord and regular operator's cord, associated with subscriber's line.

of the circuit which are used for transmission, listening, and ringing may at once be cut out. In addition to this, the local primary circuit of the tone test transformer with its battery and interrupting commutator may be done away with, and also such local circuits through lamps, repeating coil, etc., as do not directly

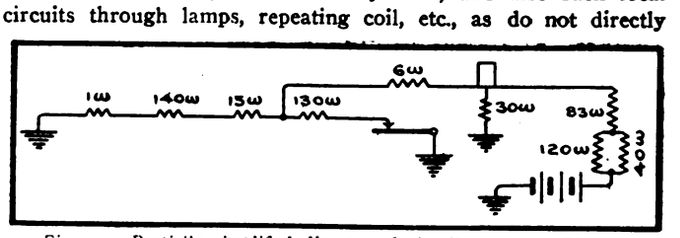

Fig. 14. Partially simplified diagram of circuit shown in Fig. 13.

enter into the connection in question. After these have been eliminated it is a comparatively easy task to trace the remaining lines of the diagram from the battery to the sleeves of the jacks. It is well to start at the battery end, and work toward the jack, drawing the simplified circuit out, setting down the separate resistances, and checking off the different items on the original circuit with the progress of the work through its different steps. The application of this process results in the production of a simplified circuit which contains the elements of the desired connection arranged in a comparatively simple form, as shown in Fig. 14. This circuit shows all resistances in such a manner that very little work beyond the adding of the resistances to obtain

*Continued from the issue of Nov. 18.

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their sum is necessary, as they are seen to be nearly all connected in series. In certain portions of this diagram, however, there

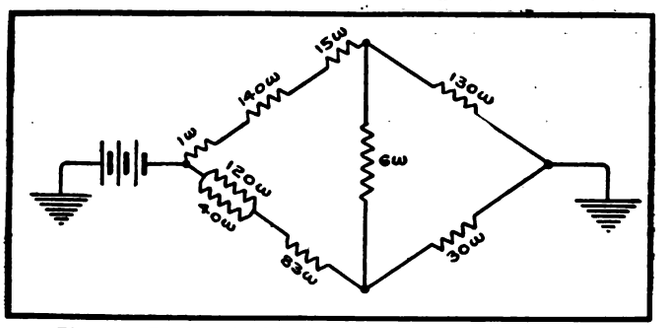

Fig. 15. Further simplification of circuit shown in Fig. 13.

appear combinations of two separate resistances connected in multiple, and their joint value may be found from an application of the well known formula $r = \frac{a \times b}{a + b}$, where r is the joint resistance, and a and b the resistances of the separate paths. For these separate resistances may then be substituted a single resistance equal to their combined value, and the circuit will then involve only the addition of resistances for the purpose of obtaining the single value desired. In Fig. 15 is shown another method of arranging a simplified diagram of the circuit in question, which illustrates more clearly the total resistance between the opposite terminals of the battery.

The advantages of this graphical method over the arithmetical plan previously mentioned are numerous. In addition to the assistance which it gives toward the general understanding of the workings of circuits it enables the work once performed to be verified in the shortest possible time. The clearness of its results are readily apparent, and are only equalled by the ease with which the plan may be worked out when once properly understood and put into practice.

OFFICIAL BULLETIN NUMBER FIVE OF THE NATIONAL-INTERSTATE TELEPHONE ASSOCIATION.

General Headquarters, Cleveland, Ohio.

MAPS:

Maps of Indiana, Michigan, Missouri and Pennsylvania have been almost completed. We had hoped to finish one or more of these in time for publication this month, but the tardiness of a number of companies in furnishing data requested has made this impossible. We expect to finish these, and a number of other State maps during the coming month. Complete map of Ohio will be ready for general distribution on or about December 20th.

We must again urge Independent companies to be more prompt in responding to our request for map data. It will be impossible for us to compile maps of the various States without the co-operation of the Independent companies who operate toll lines.

EXECUTIVE COUNCIL:

Mr. C. E. Wilson, General Manager of the Keystone Telephone Company, Philadelphia, Pa., has been appointed a member of the Executive Council to succeed the late Mr. W. D. Barnard. A meeting of this Council, to be held in the Office of the President at Cleveland, Ohio, was called for November 24th. A list of committees appointed, and a report of other matters considered at this meeting will be given in the next bulletin.

COMMITTEE ON LITIGATION AND LEGISLATION:

This Committee held a joint meeting with the Executive Council on November 24th, and a report of its proceedings will soon be published.

WARNING TO INDEPENDENT TELEPHONE COMPANIES:

During the past six weeks the Association's attention has been called several times to circular letters which are being sent out in a number of the States by individuals and corporations representing themselves as promoters for Independent Telephone Companies or Combinations. All Independent Companies receiving such letters are warned against giving out information regarding their plants without first satisfying themselves that it is not being furnished to irresponsible parties, and that it will not be used in any way to the detriment of the Independent telephone movement.

AN INDEPENDENT SLOGAN:

It has been suggested by a number of prominent telephone men that the Independent companies of the country on all future directories print the phrase, "LOOK FOR THE SHIELD" in quotation marks as here shown, and also use this in their other advertising. This is already being done by a number of the companies in various States. The idea is to make this phrase distinctive in Independent advertising. The Association merely submits this for the consideration of its members.

EUROPEAN TELEPHONE SERVICE CONDEMNED BY TRAVELLERS.

TRAVELLERS returning from Europe are stronger than ever in their condemnation of the telephone service upon the Continent. In many instances it has been found that considerable time could be saved by using the telegraph or even by making the call in person. Many of the largest cities have an extremely small number of subscribers compared with cities of the same size in the United States. London, for instance, with a population approximating 6,000,000, has only 94,000 stations, and Buda Pest, in Hungary, has about 8,000 telephones for a population of over 800,000. The reason for this low percentage of telephones to the population is due to several causes, chief amongst which is an antiquated apparatus, an almost entire lack of knowledge of the business and ultra conservatism.

One of the largest dry goods merchants in London when asked why he did not install a telephone system, replied in effect that it would disorganize his business, that special clerks would be required to attend to telephone calls and that about sixty telephones would be required. Such a reply seems extremely ridiculous in view of the extensive use of the telephone made by similar stores in this country. Long distance service is poor and no great distances are covered, the lines between Paris and Berlin and between Paris and Turin being considered exceptional.

There are, however, a few exceptions to the conservative regard

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for the use of the telephone in Europe by the majority of the people. King Edward of England is one and the Pope is another. Each of these personages has equipped his palace with telephones and is a frequent user of the local and long distance lines. At present the general trend of development appears to be along the lines of American practice. In fact, many of the larger companies and those countries controlling the service are sending their experts to study American methods and are installing American apparatus.

UP-TO-DATE ELECTRICAL SUBWAY FOR HAVANA.

By G. W. Dennison.

THE city of Havana has recently got in line with its northern neighbors and is preparing to do away with the unsightly and inconvenient network of overhead wires which have encumbered her streets. Plans have been made for the construction of a subway system which will provide for a most comprehensive scheme of wire distribution. The plans provide for the construction of a subway in which will be provided proper space for all kinds of electrical conductors, which facilities for underground service will be rented to different companies as they may make application for them. Amongst the number of companies which may be served by this subway system may be mentioned the Red Telefonica de la Habana, Sociedad Anónima, which company has the telephone concession; the Havana Electric and Gas Company, the Havana Electric Company, the Compañia de Electricidad de Cuba, as well as the Government telegraph service.

Work on Havana Subway on Aguila St.

It is believed that this single subway system will not only be more satisfactory to the city at large, but the rental charge will be more economical for the patrons than would be the installation and maintenance of their own individual underground systems of distribution.

On October 26th City Engineer D. Lombillo Clark, of Havana, Cuba, signed the permits for the Havana Subway Company to proceed with the installation of the complete electrical subway system and the contract for the work was secured by George M. Painter, of Chicago and New York, the well known subway engineer. Mr. Painter serves in the double capacity of contractor and engineer for the Havana Subway Company. He has just finished the electrical subway and cable contract for the Citizens' Telephone Company of Columbus, Ohio. The cost will be between eight hundred thousand and one million dollars for the present installation. Work is already well under way, and as soon as they can be secured, 500 men will be used to push the subway to completion. It is expected that the entire system will be ready for drawing in cables in about six months from the present time, as the construction is to be rapidly carried on.

The personal staff of Mr. Painter on the Havana work includes two engineers, Malcolm J. Beeton and Norman Malcom, of Chicago; two draughtsmen, Cesar Rodriguez and A. B. Hill, of Havana; Private Secretary H. P. Hughes, of Mexico City; Division Foremen H. G. Morse, of Chicago, and William Kennedy, of Havana; ten cable splicers from the States and three senior foremen.

In many of the plans novel applications of concrete construction are made.

EXTENSION OF INDEPENDENT SERVICE RECENTLY MADE IN PENNSYLVANIA.

The Carmichaels Telephone Company of Green county, Pa., has recently arranged for the sale of its plant to Uniontown capitalists, headed by J. V. Thompson.

This change of ownership will solve the telephone complications in Green county which were caused by the South Penn Company of Waynesburg entering into an agreement with the Beli company, as a result of which the Independent telephone companies were virtually cut out of Green county service. The change is considered a victory for the Independent companies as the parties making the purchase are friendly to them and active competition will be at once taken up.

The holdings of the Carmichaels company consist of two exchanges, one at Carmichaels and the other at Jefferson, besides toll lines to Masontown and one to within one mile of Waynesburg, and a franchise in Waynesburg, which was granted in 1897. The new company will be known as the West Penn Telephone Company. Arrangements are being made to secure a West Virginia charter and to extend into Waynesburg where pay stations will be established within a very short time as well as a messenger service. It is proposed to establish an exchange in Waynesburg as soon as possible. Later it is the intention of the new company to enter into the rural telephone service as well as local.

CONSOLIDATION OF INDEPENDENT PROPERTIES IN MISSOURI AND ARKANSAS.

NEGOTIATIONS are in progress for the addition of the telephone lines centering in Shambo Ferry and Anderson, Mo., to the system of the Potter Telephone Company. The Potter Company is already one of the largest Independent companies in the State, controlling several exchanges and a number of copper toll lines. This will extend the facilities for Independent telephone communication in this section of the country, as it will enable the Potter Company to connect with numerous additional subscribers. With the rapid extension of systems and closer association of operating companies the state of Missouri is fast increasing its importance as a centre of Independent activity.

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THE EDITOR'S PAGE

STORAGE BATTERY MAINTENANCE.

ONE of the features which has grown in importance with the rapid increase in the number of telephone subscribers in recent years has been the increase in the size of the batteries supplying power for the operation of telephone systems. A few years ago it was the practice to use small cells, with the idea of providing current supply for only a short time. A battery of this type did not have capacity for a very rapid growth of the exchange, and was as a rule only large enough to do its appointed work for a very few years, as it was not expected that the life of the battery would be of long duration. The cost of this equipment was not large in comparison with the rest of the plant, the importance of its care was a comparatively minor point, and consequently the battery was much neglected in most telephone exchanges. Moreover, at this time the maintenance of storage batteries was a question about which there were a great many disputed points, and very little general information was at hand.

In recent years, however, with the remarkable rate of extension of the telephone service, it has been necessary to provide for this rapid growth in all portions of the exchange equipment. The requirements brought about by this condition of rapid increase have caused the bringing out of new inventions, which have made it possible to add to the capacity of the storage battery from time to time as the need occurs. It has also been found that a battery can be made to give satisfactory service for a longer period than was anticipated. As with the present method of installing tanks partially equipped with plates it is not economical to add to the equipment of the battery units at very frequent intervals, it is customary to install at the time the plant is originally put in operation a battery large enough to last for several years. Consequently the initial cost is high, and annual charges are felt, to some extent, on idle equipment. As the cost of the battery installation often runs from $400 to something considerably above $1,000, it is important from the standpoint of expense to make the rate of depreciation low. In addition to this, the condition of the batteries has an important effect upon the service. If the capacity is lowered by poor care, it is necessary to keep the machines running the greater part of the day. The almost unavoidable effect of this is the production of a slight noise on the system, which is extremely annoying to subscribers and operators. In such a case also when the machines are not running the signals and transmission suffer to some extent from the inability of the battery to sustain the required voltage across the bus bars for any considerable period.

The condition of the battery may be injured, or its life diminished, by two classes of inattention. Constant slight neglect or carelessness in its maintenance produces faults which increase from day to day, until the plates are in a very serious condition. It often becomes necessary to renew a battery which has been subjected to this sort of treatment in as short a time as three years, less than one-half of its normal life. Again, although the battery may usually be treated with the utmost care, some special accident may bring about a severe injury, such as buckling of the plates, or ruining them through the presence of a metal accidentally dropped into the cell.

It follows that the most constant and careful attention is required on the part of the man in direct charge of the plant. The rules which should guide him in his work are simple and should be well digested by him. It is not necessary that the theory of the action of the batteries should be fully known, even if it were possible to correctly understand this, but a familiarity with their operation that will enable him to gather the true significance of every change in color, voltage or specific gravity is of the greatest advantage. The subject is so important that it calls for careful study by the men in general charge at the headquarters of a telephone company. Good results will follow every endeavor to encourage the pride of the local forces in good equipment. Assistance can be given to their exchange men in the acquirement of a knowledge of the points involved in controlling the battery which will be appreciated by the men and valuable to the company. One of the most important of the things which they can do is the insistence upon the taking of correct records, the keeping of such records in proper form, and the giving of specific instructions in detail based on a careful analysis of such individual records.

Electric light and power companies keep records which are very complete and arranged on a plan most carefully worked out for the fulfillment of the desired purpose. It is extremely improbable that the proportion of the expense of keeping these records to the saving effected by their use is greater than would be the case in a telephone plant. In this connection it is noteworthy that the assistance offered by the leading manufacturers of storage batteries to their purchasers is unusually complete and satisfactory.

Proper attention to this subject of battery maintenance will bring about in each case a saving due to the retaining of the battery in service during its entire normal life. In addition to this it will also make certain reductions in the cost of the prime source of power, whether it be gas or electricity, which will be spread over several years, and finally will, beyond doubt, contribute in a considerable degree to the efficiency of the service.

TELEPHONE INVENTIONS.

A REMARKABLE fact connected with the development of telephone exchanges has been found in the origin of improvements in apparatus. In this respect it offers a noteworthy contrast to many manufacturing establishments, where much of the machinery has been developed by the men who have operated it in its imperfect stages, and set out to remedy the evils which they have had forcibly called to their attention during the performance of their work.

In telephone work, however, specialization of effort has been the rule which has appeared to govern the methods of carrying on the industry from its very beginning. Some men devoted themselves exclusively to the forwarding of business plans, while others were concerned almost entirely with the invention of improvements which would facilitate the service. While certain individuals have been active in the inventive field at one part of their careers, and have distinguished themselves in other lines at a different time, it has been rare indeed for any one man to be making direct contributions toward the development of apparatus at a time when he was engaged in important work concerned with the operating of the plant.

An explanation of these peculiar conditions has been said to lie to some extent in the rapid growth of the business. The development has come so quickly that the energies of each man have been fully occupied in advancing one of its single branches. The result has been a separation of functions, and a specialization which has probably made itself evident to a degree beyond that attained in other lines of endeavor.

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THE TELEPHONE IN THE COURTS

CONDUCTED BY A. H. MCMILLAN.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

DANGER FROM INDUCTION.

The city electric light company insists upon putting its wires within four feet of our wires. Is there any possible way in which the electric light company could beat us if we brought suit for an injunction to restrain them from getting so close? Has there ever been a case in which a telephone company was denied such relief?

THERE is a case in which a telegraph company was denied the relief you speak of, but the difference between a telephone company and a telegraph company is so slight in this respect that we believe the case would apply equally well to both kinds of companies. In this case the court denied the injunction on the ground that the bulk of the evidence was against the sensible diminution of current by induction and that it appeared that linemen would not be in danger, if careful, except when doing certain work, when the electric light company's current, on notice, would have to be stopped. This case was not decided by a court "of last resort," and so might not be recognized as authority. W. U. T. Co. v. Champion Electric Light Co., 14 Wkly. Law Bul. 327 (Ohio, 1885).

DAMAGE TO SUBMARINE TELEPHONE CABLE.

The cable of our telephone line that extends under the surface of the river and connects the exchanges in two adjacent cities on the opposite banks of the river was caught up by the shovel of a steam dredge working for the United States government and so damaged that service was interrupted for a week. Can you cite us to any case bearing on the subject?

S. V. C.

THE only case we know is the following: Where a telegraph cable laid across a river under water was caught up by the screw of a propeller and was wound around the shaft so that the cable was broken and damaged, the owners of the boat were held not liable for the injury to the cable. Stephens & C. Transp. Co. v. Western Union Teleg. Co., Fed. Cas. No. 13,371.

MECHANIC'S LIEN LAW EXTENDS TO TELEPHONE LINES.

Is there a law in this State (Indiana) by which persons who have performed work in erecting a telephone line can claim a lien upon the property to secure their claim? If so how must the property be described? The man we are having trouble with served on us a notice claiming a lien on "all the property of said telephone company in said county." B. V. I.

UNDER Act Ind., March 6, 1883, a lien is given for performing labor in erecting any structure upon land. This lien extends to labor performed in stringing telephone and telegraph wires on poles. The statute requires a "substantial description" of the lot or land upon which the structure is erected to be given in the notice of such lien filed. Where a notice simply claimed a lien on the property of a telegraph company in the designated county it was held insufficient under this law. Vane v. Newcombe, 132 U. S. 220.

COMPANY WISHES TO TRANFER ITS FRANCHISES.

THE filing of an amended bill of complaint on behalf of Alexander Brown, the Baltimore, Md., banker, has caused a postponement of the argument in his suit to restrain the Maryland Telephone Company from transferring its electric lighting and power franchises to the Baltimore Electric Power Company without proper consideration. The Maryland Telephone Company has demurred to the bill of complaint and also made a motion to strike out certain paragraphs of the bill of complaint on the ground that they were "scandalous, irrelevant and impertinent." Complainant's lawyers were granted leave to file an amended bill. An order was signed by Judge Dennis giving the telephone company thirty days within which to show cause why the injunction asked for by complainant should not be granted.

FIXING OF RATES IN CITY FRANCHISE WITHOUT VALIDITY.

A CITY has not the authority to fix or limit the rates charged for service by a telephone company operating under a municipal franchise, and when such regulation of rates is made a part of a franchise by a municipality, that provision is without validity. The remedy against exorbitant rates, however, is not absent, for any patron can bring suit to have the rates complained of declared unreasonable.

This is the substance of an opinion rendered by Attorney General Sturdevant of Wisconsin in response to inquiries made by City Attorney A. S. Douglas of Monroe, who called upon and conferred with the State's legal adviser in relation to a franchise of the Monroe Telephone Company. The city attorney was desirous that the attorney general give consent to the bringing of an action in the name of the State to declare void the franchise of the company on the ground that the company intends to raise its rates of service largely above the rates specified in the franchise ordinance.

So far as the controversy in Monroe is concerned the opinion of Attorney General Sturdevant is against the city and in favor of the telephone company. If the city had the right to fix or limit the rates the company could not raise the rates under its franchise, but it is quite another thing for a patron to establish in a legal action the fact that rates are "unreasonable," for that would involve the examination of the cost of the service and would entail so many other details as to make a long and difficult process of litigation.

The attorney general made a careful examination of the authorities and came to the conclusion that the Legislature alone has the right to fix or regulate the rates of public service corporations, and that at the time the franchise ordinance was enacted the city of Monroe had no such right. The attorney general holds that the Legislature might provide that municipalities may regulate rates.

COMPULSORY CONNECTION OF TELEPHONE COMPANIES.

THE Texarkana Telephone Company has been making a commendable effort recently to induce the council of its city to insert a clause in the franchise asked for by the Southwestern Telegraph and Telephone Company in that city requiring them to connect their long-distance switchboard with the local switchboard of the Texarkana Company and receive and to transmit toll messages to points reached by their lines from any person using a telephone who desires to make a call, has the price to pay for the same and is willing to comply with the customary regulations of the company. This amendment would allow the Southwestern Telegraph and Telephone Company to keep all the toll charges, the Texarkana Telephone Company getting none of the fees. The Texarkana Company offers to pay all the expenses of making the physical contact between the lines.

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IN THE OPERATING FIELD

CUYAHOGA TELEPHONE COMPANY FURNISHED EXCELLENT ELECTION SERVICE.

THE service in furnishing the election returns by the Cuyahoga Telephone Company in Cleveland was far superior to that given by any other company. In many instances it was from two to thirty-five minutes ahead of its competitors and these included the daily newspapers. On New York news it was ahead of all other news agencies. This beat was accomplished by the Cuyahoga Telephone Company working in co-operation with the De Forest wireless station at Nottingham. Besides its own lines, the toll circuits of the United States Telephone Company were utilized to secure returns.

W. B. Woodbury, assistant general manager of the company and a former newspaper man, was editor-in-chief and managing editor of the service, with an organization of 256 men under him engaged in gathering and distributing election news. Of these, sixty were constantly reading bulletins to subscribers. Fifteen stenographers, each making seven copies, manifolded all news received. An exchange operated by men was improvised for the occasion and every subscriber asking for news was connected with this department, so that the regular exchange business was not interfered with.

The company estimates that 15,000 of its 20,000 subscribers' instruments were constantly in use receiving returns from 6:30 P. M. to 12:20 A. M. In addition the company provided bulletin service for the Hollenden and Colonial hotels, the food show, all the clubs and theatres and a stereopticon on the Public Square.

NEW TOLL LINES IN WESTERN PENNSYLVANIA WILL PROVIDE MUCH NEEDED FACILITIES.

INDEPENDENT service in the territory adjoining Morgantown, Uniontown and Connellsville, in Pennsylvania, has recently been much improved by the completion of new toll lines. For some time past the toll system was taxed to its utmost and the volume of business was constantly growing. To alleviate this condition extensive new construction was set under way and several new lines are now being built. One toll line which forms an important connecting link between Uniontown and Morgantown was recently completed. It was jointly built by the Tri-State Company of Uniontown and the People's Company of Morgantown. The route covers a distance of thirty miles and goes by way of Cheat Haven. Of this distance each company built one-half.

The People's Telephone Company has an extensive lead over its competitor, the Bell Company, in Morgantown, having about 1,000 telephones connected at that point, of which about 800 are in Morgantown alone.

EXTENSIVE IMPROVEMENTS CONTEMPLATED FOR BELVIDERE, ILL.

STOCKHOLDERS of the Belvidere Telephone Company have recently authorized the directors of the company to issue bonds to cover the expenditure necessary for the reconstruction of the plant. This reconstruction will entail the installation of a new switchboard and the changing of all the instruments to the latest type. It is expected that this work will cost in the neighborhood of $50,000. The Belvidere Company was one of the first companies in this vicinity to take up the fight against the Bell and, notwithstanding the latter company's claim of having spent $100,000 in improving its plant, the home company has secured the major portion of the business. The Belvidere Company is purely local as far as its management is concerned and the majority of the stock is owned by prominent men of affairs in the town.

CITIZENS' COMPANY OF ST. JOSEPH, MO., TO RECEIVE SUPPORT OF RETAIL MERCHANTS' ASSOCIATION.

RESOLUTIONS were adopted at a recent mass meeting held at the Commercial Club at St. Joseph, Mo., under the auspices of the Retail Merchants' Association, to give the exclusive support of members of the business associations to the Citizens' Telephone Company.

Pursuant to this end President Neudorff, of the Retail Merchants' Association, will endeavor to secure action favorable to the Citizens' Telephone Company from the individual business organizations of the city. At a meeting of the Retail Grocers and Butchers' Association a committee was present to urge that body to declare in favor of removing all Bell telephones from the business houses of its members and the substitution of Citizens' telephones where not in use. The meeting was called to discuss the "telephone situation." President Neudorff, of the Retail Merchants' Association, presided. The reports from the committee which investigated the properties of the Citizens' people favored that company.

Of the ninety-four business men present at the Retail Merchants' Association meeting representatives of thirty-nine business houses signed an agreement to order telephones from the Citizens' Telephone Company at once.

The Citizens' Company was represented by Dr. J. J. Newell, president and manager, and M. M. Riggs, vice-president. President Neudorff, in his brief opening speech, gave a clear sketch of the telephone situation. He said that the Bell people had attempted to coerce the business men of St. Joseph into paying more for their telephones than past contracts warranted and that $40 a year per telephone for the next nineteen years in agreement with the charter of the Citizens' Telephone Company is a better prospect for the people of St. Joseph than an ambiguous proposition for some time to come.

ANNUAL CONVENTION OF WISCONSIN ASSOCIATION TO BE HELD IN MILWAUKEE.

THE annual convention of the Independent Telephone Association of Wisconsin will be held in Milwaukee December 20th and 21st. The headquarters will be at the Pfister Hotel. The date has been changed, as this is supposed to be a more favorable time than February, at which time they have usually been held. A very attractive programme has been prepared, and as the attendance at these meetings is always large, all interested parties are likely to find it a very profitable meeting.

TOLL LINE TRANSMISSION IN IOWA TO BE IMPROVED.

THE Mississippi Valley Telephone Company of Burlington, Iowa, is making extensive improvements in its toll lines. New lines are being built, and iron wire on the present poles is being replaced by copper. A partial list of the exchanges in western Illinois which will be provided with connections to Burlington by the extensions now in progress, with the number of telephones in each, is as follows: Monmouth, 1,300; Macomb, 2,000; Galesburg, 2,000; Stronghurst, 300; Biggsville,

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230; Kirkwood, 200; Little York, 200; Alexis, 300; Gerlaw, Roseville, Cameron, Berwick, Carman, La Harpe, Blandinsville and numerous other towns having exchanges of considerable size. The toll line to Keokuk is also being rebuilt.

These important additions and improvements in the present system are being made under the direction of R. P. Purchase, manager, formerly of the Nebraska Bell Telephone Company, and D. R. Cannon, general superintendent, formerly with the Northwestern Bell Telephone Company. The execution of their plans will connect numerous towns which have hitherto been without toll line connection with Burlington, and will make an improvement in the facilities enjoyed by many thousand subscribers.

EFFECTIVE RESPONSE TO CALL FOR EMERGENCY REPAIRS.

IN response to an inquiry relating to damage to the cable plant of the Kansas City Home Telephone Company we have received from General Manager O. C. Snider the following account: "Report came in over the wire at 2:45 P. M., Saturday, October 15th, to the effect that the trunks between our main and east offices had been cut out of service by reason of a fire in the alley north of Peery avenue. This trunk cable was carried on poles and the building destroyed by fire was a barn which was possibly worth $50, showing the advisability of placing cables underground wherever possible. Two 100-pair trunk cables and one 100-pair local cable were burned for a distance of about 100 feet. The cable messengers and a 25-pair cable box were also destroyed.

"Within less than two hours construction men were on the ground and were busy making repairs. The cable and messenger were erected by 9 o'clock the same evening and by 5 o'clock the next morning all the splices, consisting of three 100-pair straight splices, three 100-pair tag splices, and one 25-pair pothead were made. The men worked through the entire night, which was very cold and wet."

The incident which this letter describes is a very creditable example of the large amount of work which can be accomplished by a well trained force of cable men, working under the pressure caused by an accident.

INDORSEMENT OF CHECK OVER TELEPHONE.

IS a bank cashier's word over the telephone good? This is one of the questions involved in a suit lately argued in the supreme court of Kansas, in the case of the Interstate National Bank vs. J. W. Ringo and others. Ringo gave a mortgage for $10,000 on some cattle in Oklahoma and the Watkins National Bank of Lawrence bought the paper. When it fell due the Watkins Bank sent it to the Interstate National Bank for collection. Ladd, Penny & Swazey, commission merchants, who handled Ringo's business, gave the Interstate National Bank a check for the $10,000 on the Merchants' Bank of Kansas City, Kas. Before accepting it the Interstate National cashier called up the Merchants' Bank by telephone and asked if the check was good. The assistant cashier said it was. The next morning the cashier of the Merchants' Bank telephoned the Interstate National that his assistant had made a mistake the day before and that the check wasn't good. In the meantime the Interstate National had credited Watkins Bank with the collection and turned the mortgage over to the commission firm. Upon receipt of the second telephone message it went to the commission company's office and got back the mortgage and cancelled the credit to the Watkins Bank. Ringo, it seems, had given another mortgage to take up the first one and turned it over to somebody. It got in the hands of the Boatman Bank at St. Louis. Then Ringo got judgment in the Wyandotte courts to cancel the first mortgage. The Watkins Bank sued the Interstate National for the $10,000, claiming that it had closed the deal and that in accepting a check of the commission firm instead of cash it should stand the loss. The Interstate National claims that the first telephone message saying the check was good should absolve it from loss. The Watkins Bank got judgment in the court below and the Interstate National appealed.

HOW TO MAKE A THREE-WIRE SPLICE.

By Chas. A. Kimball.

THE three-wire splice, skilfully made, will eliminate the necessity for soldering in iron line construction, and insure freedom from high resistance joints. The superior conductivity of these joints lies not in the cross turns at the ends but in the spiral twist at the "neck." Examination of the interior of a piece of galvanized messenger strand that has been exposed to the weather for five or six years will disclose the principle of the three-wire splice.

Seeing numerous linemen attempt the three-wire splice with a pair of pliers and only one pair of connectors (with sorry results) has led the writer to believe that the proper method of making this joint is not known to all of the craft. Three wire joints should be long in the "neck" and made up without any marring of the galvanizing at this part of the joint. This can be accomplished only by the use of two pairs of connectors. Overlap the ends to be spliced about 18 in. and cut a third wire 18 in. long of same gauge and lay it with the ends to be spliced, Fig. a. Clamp two pairs of connectors over all towards the

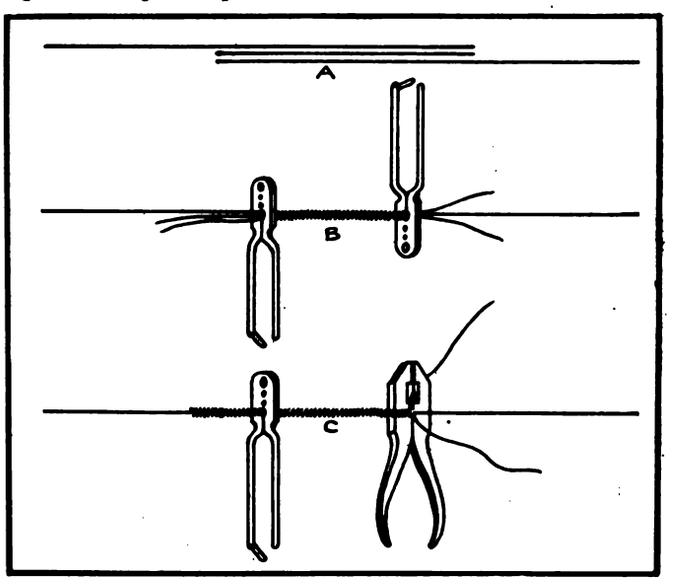

Diagram showing method of laying wires and using tools in making three-wire splice.

center and about 5 in. apart and revolve connectors in opposite directions, slowly so as not to "burn" the wire, Fig. b. Care should be taken to revolve connectors evenly and at the same speed. Turning one pair faster than the other will result in a "humped" joint. When the wires have been twisted to a tight lay, remove the connectors and clamping one pair on the neck to hold the work, use pliers and finish the ends with six or seven cross turns the same as in an ordinary W. U. splice, Fig. c.

HOME COMPANY OF SOUTH BEND INCREASES NUMBER OF SUBSCRIBERS.

THE new directory of the Home Telephone Company, which will be issued at once, will show a marked increase in the number of subscribers to the system in St. Joseph County. Over 4,500 telephones will be listed. Conditions were never more prosperous and the plants in the different towns are nearing the point where extensive additions will be necessary to take care of the growing demand for Independent service.

Theodore Thorward, president of the Home Company, in an interview denied the statement that the rates at Mishawaka were to be raised. He said in addition that the present rates were entirely satisfactory to the people as well as the company and that even if they desired to raise the subscription they could not, as it is limited by the franchise.

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MIDDLETOWN, N. Y., TO HAVE INDEPENDENT SYSTEM.

MIDDLETOWN, N. Y., which for the past months has been without Independent telephone service owing to the fact that the Orange County Telephone Company became a sub-licensee of the Bell, is now in a fair way to secure the desired connections. It will be remembered that several months ago the application of the Middletown Telephone Company for a franchise in the city of Middletown was vetoed by Mayor Hornbeck. The officers and stockholders of the Middletown Company contended that a franchise was not necessary and that if they obtained the consent of sufficient property owners to insure right of way they could put up their wires unmolested and transact their business without fear of any legal proceedings.

One of the officers recently stated that the company would be in readiness to transact business in a surprisingly short time. He said that the beginning would be a modest one, but that the stockholders expected the system would grow at a rapid rate. The company has already started active operations and has several men at work putting up the wires.

$100 PER DAY FOR KEEPING TELEPHONE OUT OF HOUSE.

IN a suit against the Memphis Telephone Company in the Circuit Court I. Goldberg, of Memphis, Tenn., seeks to collect damages in the sum of $5,000. The suit is based upon a State statute which provides a penalty of $100 for each day a telephone company arbitrarily keeps a telephone instrument out of a house of a subscriber who has a contract for service. Goldberg alleges that he had a yearly contract with the defendant company to furnish him service and that the service got poor and he registered a complaint. It is averred that the company, or one of its agents, took the instrument out of his house and kept it out for fourteen days without making any provision to give him service. The declaration asks for $1,400 as the penalty prescribed by law and the remainder for damages, punitive and actual, as a result of the loss of the telephone service for that period to his business.

CHICAGO ELECTRICAL SHOW ATTRACTS MANY IMPORTANT EXHIBITIONS.

THE success of the show to be held under the auspices of the electrical interests in Chicago, incorporated under the name of the Electrical Trades Exposition Company, may be estimated from the fact that nearly one-half of the available 38,000 square feet of the big Coliseum building has already been taken by the leading manufacturers and dealers in electrical appliances and apparatus, who will exhibit the newest and best things developed to date in every branch of the electrical industry. The exhibition will continue from January 15 to January 27, with the object of acquainting the trade and the general public with the numerous ways in which electricity may be applied to the daily uses of mankind and with the countless appliances which are on the market, all contributing toward the convenience, comfort and profit of the housewife, the business man and the manufacturer.

The company conducting the Exposition includes as stockholders seventy-five of the leading electrical men of Chicago, and is officered and managed by men well known in the electrical industries of that city, a fact which in itself is sufficient guarantee that everything possible will be done to make the affair a complete success.

These are the officers: Samuel Insull, president; Edward B. Ellicott, Chas. E. Gregory, E. B. Overshiner, vice-presidents; John J. Abbott, treasurer; Stewart Spalding, secretary; Thomas R. Mercein, general manager.

The directors are Samuel Insull, Edward B. Ellicott, T. P. Gaylord, James Wolff, H. B. McMeal, C. E. Mitchell, Homer E. Niesz, E. B. Overshiner, G. H. Atkin, Stewart Spalding, Charles E. Gregory, G. Edward Kohler, George B. Foster.

Amongst the many features of exceptional interest there will be daily tests of wireless telegraphy and the newer discovery—wireless telephony. It is expected that the various telegraph companies will race around the world with messages, one going by way of the Pacific, another by the Atlantic. The Swedish-American Telephone Company proposes to show that it is possible to hear the queer noises of the heavens. This company will send immense kites, covered with gold leaf, 5,000 feet above the Coliseum. Each kite will be equipped with a strong and sensitive transmitter, with telephone wires connecting with receivers in the Coliseum. Experiments already made show the possibility of receiving many curious noises. The Frank S. Betz Company, of Hammond, Indiana, will show an enormous static machine. This firm is now constructing two special electrodes and a special coil for this purpose. The spark will shoot across the top of the Coliseum from time to time, creating the most brilliant and startling arc of light ever produced.

Amongst the firms already assigned to space are the following:

Chicago Edison Co.	General Electric Co.
Allis-Chalmers Co.	Westinghouse Co.
Chicago Telephone Co.	Swedish-American Telephone Co.
Frank S. Betz Co.	C. H. Thoradson.
American Steel & Wire Co.	Monarch Electric & Wire Co.
Guarantee Electric Co.	J. L. Schurman Co.
Electrical Appliance Co.	Reynolds-Dull Flasher Co.
Roth Bros. & Co.	Haller Machine Co.
American Electric Co.	Sprague Electric Co.
Vesta Accumulator Co.	J. Lan Electric Co.
Crane Electric Co.	Fort Wayne Electric Co.
Chicago Battery Co.	Osborne Flexible Battery Co.
Electric Storage Battery Co.	Federal Electric Co.
Overbaugh & Ayers Mfg. Co.	Peru Electric Mfg. Co.
Sam J. Gorman & Co.	Central Electric Co.
Miller Anchor Co.	H. T. Paiste Co.
Crocker-Wheeler Co.	Universal Electric Storage Battery Co.
Mark Mfg. Co.	
H. E. Cobb.	McFell Electric Co.
Western Electric Co.	George W. Conover.

TO OUST EAST TENNESSEE COMPANY FROM PADUCAH.

A SUIT to oust the East Tennessee Company from the rights and privileges of the streets of Paducah, Tenn., unless the company purchases a franchise was filed in the circuit court by the city solicitor of Paducah. The petition charges the East Tennessee Telephone Company with usurpation of its authority and asks the court to award the city of Paducah the franchise privileges now usurped by the East Tennessee Telephone Company.

Some time ago the East Tennesee Telephone Company agreed to purchase a franchise from the city. An equitable franchise was prepared a few months ago and put up and sold by the mayor. The East Tennessee Company paid no attention whatever to the sale of the franchise, having no bidder on the ground when the sale was made, and through its official organ announced that it did not intend to buy a franchise. The franchise was along the line of the one under which the other telephone company in Paducah is operating and was sold for $20. The sale was rejected by the council and aldermen.

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QUERIES

INSTALLING VISUAL SIGNALS, WITH BRIDGING AND SELECTIVE RINGING.—(623.)

My system has full metallic iron wire lines from 4 to 9 miles long, 500w drops and both bridging and selective bells. Bridging bells are of 1,600w resistance, with from 4 to 10 on a line. Selective lines have 2,500w biased bells.

Can you furnish me with circuits for bridging telephones, also those for selective telephones, and tell me what I will need to install. O. C. S.

Fig. 623*a* shows a line and cord circuit arranged for visual signals. The battery gives 24 volts pressure and is common to all

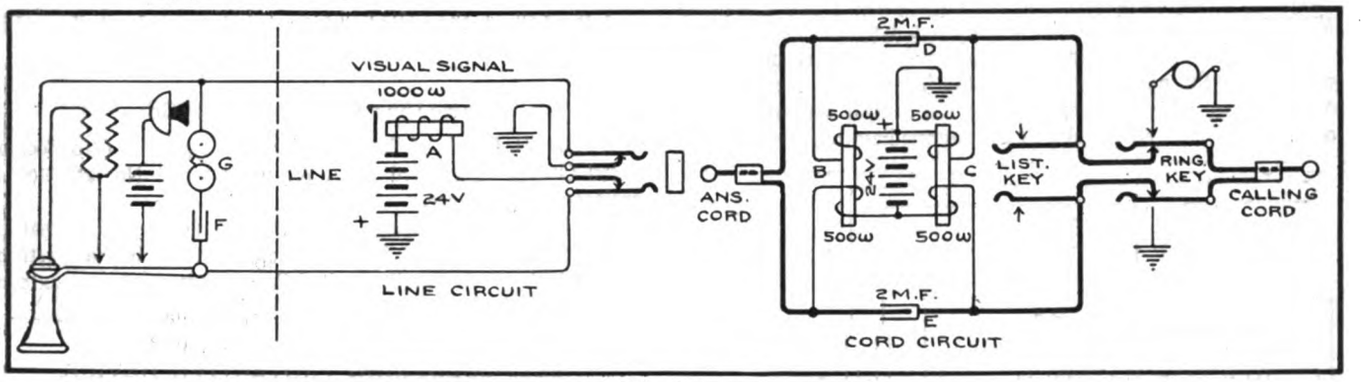

Fig. 623a.

of the lines and cord circuits. The line visual signal *A* is wound to 500 or 1,000 ohms resistance, while cord circuit signals *B* and *C* are each double wound with 500-ohm windings. The answering half of the cord circuit is divided from the calling half by two 2 m.f. condensers *D* and *E*, so as to preserve the double supervision. The ringing and listening keys can be arranged as you now have them.

The changes necessary in the bridging telephones to adapt them to signalling on these circuits will necessitate the removal of the hand generator and the bridging of the ringers *G* from the tip line binding post to the sleeve binding post, connecting a condenser of 1 or 2 m.f. capacity *F* in series with the bells, as shown in Fig. 623*c*. It is more difficult to change over a selective telephone to visual signal boards, owing to the fact that the bells of the telephones are bridged directly to ground from either side of the line and that condensers in series with the ringers will spoil the selecting and cause the bells to ring, regardless of the polarity of the ringing current. The presence of a ground connection on the sleeve side of the line, due to these party line bells, will cause the visual signal *A* to be permanently drawn up. The only remedy for this defect is the placing of a very high

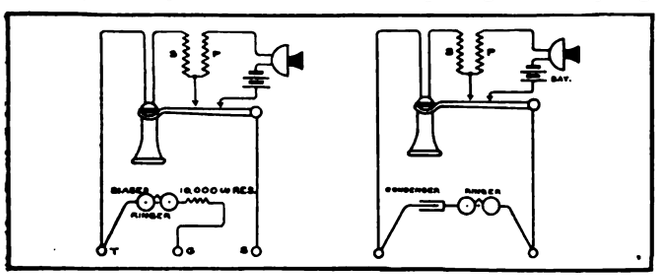

Fig. 623b.

Fig. 623c.

resistance in series with the ringer in place of the condenser as used in the bridging telephone; see Fig. 623*b*.

This resistance should be sufficiently high as to prevent enough current from flowing through the signal *A* to work it or make it stay up when once energized. A resistance of this dimension, about 10,000 ohms, greatly weakens the ringing efficiency of the selective bell and consequently requires more careful and accurate adjustment. There are several party line systems, using condensers in series with the ringers which will eliminate these troubles; also systems which in addition have no ground connections so that all telephones can be bridged across the line circuit without reference to tip or sleeve.

The presence of several telephones on each line will not interfere with the proper working of the line or cord circuits shown.

It might be well to add that the cord circuit signals shown in Fig. 623*a* are what is known as the negative type, *i. e.*, the shutter is exposed when the receivers are off the hooks and the parties are talking. The disappearance of a shutter therefore means the hanging up of a receiver. The line signals operate in the regular manner.

INDUCTION FROM HIGH POTENTIAL CIRCUIT.—(624.)

We would be pleased to have you answer the following questions:

a. **How far at the least point should the electric power wires carrying 6,600 volts on a direct crossing clear those of a telephone company?**

b. **How far on a direct parallel and directly over those of a telephone company for as short a distance as two blocks up to five?**

c. **How much greater would be the induction directly over than it would be across the street?**

In speaking of the above, we mean where a 3 phase power current is used and where a common return grounded telephone system is used. Please direct us to good books on this subject. G. T. T. C.

For (*a*) consult the National Electrical Code issued by the National Board of Fire Underwriters, rules 12-A, etc.

(*b*) You cannot avoid induction from the power circuit to a grounded, common return telephone system unless the power circuit is transposed and the insulation perfect; the telephone system cannot be transposed unless it employs individual metallic circuits.

In your case the telephone wires should be as far from the power circuit as possible, and preferably beneath the power circuit; the latter on account of mechanical considerations. The power wires should be separated from each other as little as possible—not over 18 to 24 inches. In five blocks, presumably 1,000 to 1,500 feet, there is pretty certain to be induction if the power circuit is not transposed and the telephone wires are within 8 or 10 feet.

(*c*) It is not possible to give even an approximate answer without an exact knowledge of all the conditions. But the induction when the telephone wires are across the street will certainly be less than when they are immediately over or under the power circuit; because the induction will diminish as the telephone wires are removed from the power circuit.

The best information on the subject can be obtained from the transactions of the American Institute of Electrical Engineers, the files of *The Electrical World and Engineer*, *The Western Electrician*, *The Electrical Review* and THE AMERICAN TELEPHONE JOURNAL. Few books give any extended treatment on this question; you can consult the numerous books on telephony and telephone engineering; those by Abbott and by Miller are excellent.

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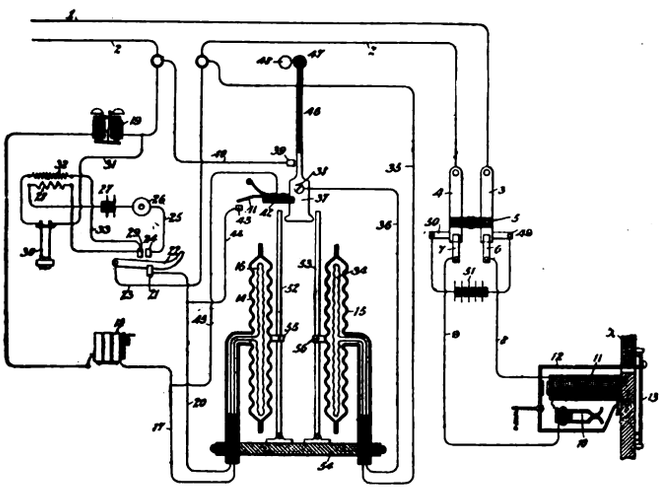
TELEPHONE PATENTS

TELEPHONE SYSTEM.

Charles Edward Egan of Chicago, Ill., patents (No. 801,778; dated Oct. 10, 1905; filed Sept. 26, 1899; serial No. 731,712; assignor by mesne assignments to the Egan Electric and Telephone Mfg. Co., of Petersburg, Ill.) a telephone system.

In this system a number of telephones are arranged on a single circuit, and the particular point in the invention is the provision of means by which the operator at the central station may cut out the coil and bell circuits of all intermediate telephones, while



conversation is held between two subscribers at the remote stations, thus reducing the resistance of the talking circuit.

In the sketch 1, 2 represent the main wires. Heating chambers 14 and 15, of thin copper, corrugated and easily expansible, are able to shift a shunt switch when operating. The contacts 41 and 43 are connected by shunt wires 44 and 45 with the circuit containing the heating coil 16. The shunt switch is a metal plate 37 mounted to swing on a pivot 38 and adapted to engage with a contact 39, from which a wire 40 leads to 2.

The current path is as follows: To line 2, to ringer 19, generator, 18, wire 17, to heating coil 16, in chamber 15, through 20, contact 21, hook 22 and wire 23 to line 2. Heating coil 16 at each station operates chamber 14, operates thereby lever 52 and swings switch 37 on its pivot. The switch movement short circuits coil 16 and throws in coil 34. By this means 47 comes opposite 48, indicating to subscribers that this particular station is busy. Furthermore, by reason of the switch making contact with 39, all others in the line excepting those in use, and in which the hooks 22 are elevated, are shunted, thus reducing the resistance of the talking circuit.

SECRET SERVICE SYSTEM.

Albert K. Andriano and Hermann Herbstritt of San Francisco, Cal., patent (No. 800,534; dated Sept. 26, 1905; filed Jan. 26, 1901; serial No. 44,838, and assigned by mesne assignments to Direct-Line General Telephone Co. of San Francisco, Cal.) a secret service system for interconnecting telephone lines.

This invention relates to improvements made in telephone systems that provide a direct connection and a signaling or calling up means, between one station and another without employing a central station and an operator. A third party cannot switch in and listen, and provision is made for isolating the subscribers talking. Improvements are made by which the talking circuit is controlled from or through the signaling circuit. The completion of a closed circuit for talking between two stations is made dependent upon the ringing circuit being completed, and the bell at the called station being rung from the calling station.

ANTISEPTIC MOUTHPIECE.

William B. Curtis of San Francisco, Cal., patents (No. 800,907; dated Oct. 3, 1905; filed April 18, 1905; serial No. 256,220) an antiseptic mouthpiece.

The invention is claimed to be a germ destroyer, in that the mouthpiece attachment is perforated, representing a partition, from which, if dust collects, it falls or passes into an external chamber filled with antiseptic material.

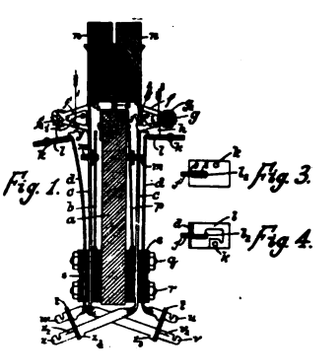
SELF-SOLDERING PROTECTIVE DEVICE.

Frank B. Cook of Chicago, Ill., patents (No. 795,197; dated July 18, 1905; filed Dec. 20, 1904; serial No. 237,728) a self-soldering protective apparatus.

This invention relates to apparatus used in connection with protective devices for electrical circuits. Its purpose is to provide means for testing the protective devices and circuits without it being necessary to move them from their operating positions. It will also serve to ground a line spring and close an alarm circuit, when a protective device operates.

In telephone systems, its use is shown by the operation of a thermal protector, through which it throws a ground and thereby actuates and controls an alarm and switchboard circuit. In Fig. 1, duplicate sets are shown, mounted on opposite sides of a ground plate. Fig. 3 shows a top view of spring *d l h*, of Fig. 1. Fig. 4 is a bottom view of spring *d l h* with the terminal *u* removed.

When a heavy current enters the device, as from *c*, it traverses the line spring *c*, heat coil *g*, and switchboard spring *d*. It finally heats the heat coil *g*, softening certain material which permits the body of the said coil to turn on its axis and permit *i* of spring *h* to turn the heat coil and release itself to open the circuit through the heat coil and ground spring *p* and *c*; shown in the right of Fig. 1. When the circuit through the heat coil



is broken, the latter cools and resolders the body thereof to the axis. The portion *i* of spring *h* may now be re-engaged with a tooth g^3 of the heat coil, to set the apparatus in operative position, shown in the right of Fig. 1. The portion *o* serves to limit the movement of spring *d l h* when the device is thus reset.

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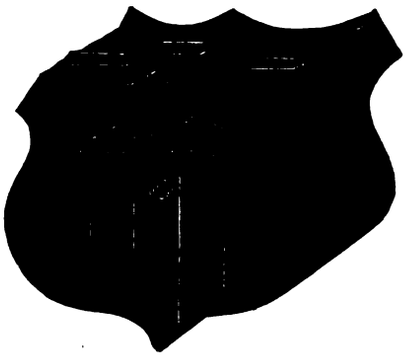

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WANTED—Eight second hand magneto telephones in good working order. State price and make, and how long in use. Address Box 511, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 511

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WANTED—Position by young married man who thoroughly understands telephones, line construction and general handling of telephone plant. Am now managing exchange in town of 26,000. Central or Western states preferred. Address Box 507, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 507

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WANTED—Experienced traveling salesman desires position. Familiar with every detail of telephone business; at present employed; wish to make change; best of reasons. Best of references. Address Box 506, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 506

A COMPETENT man can always secure a better and more suitable position if he only knew where to find it. Among the 3,000 positions on our lists there may just be the place you have longed for. Why not follow the example set by other wise men and write for booklet entitled "Brain Workers," which tells you how to get in line. Offices in twelve cities, Hapgoods, Suite 511, 309 Broadway, New York City. 464

WANTED—First-class telephone instrument and switchboard men who thoroughly understand installation and maintenance of magneto and common battery systems. Good positions for first-class men in the Central States. None but strictly first-class men need apply. State full particulars and salary expected in first letter. Address "Bell," care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 498

WANTED—A position as Mechanical Electrician in telephone work. I have had experience in telephone factory, experimental department, have had quite a varied experience in mantenance of different kinds of telephone apparatus. I can repair all kinds of trouble which requires a knowledge of electro-mechanics. I am at present employed as electrician in a most modern telephone plant. Must change my location. Good reference. Address Box 509, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 509

WANTED—Position for first-class solicitor; one hundred dollars; South preferred. Position as head of accounting department. Central states preferred; one hundred twenty-five dollars. Address Box 510, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 510

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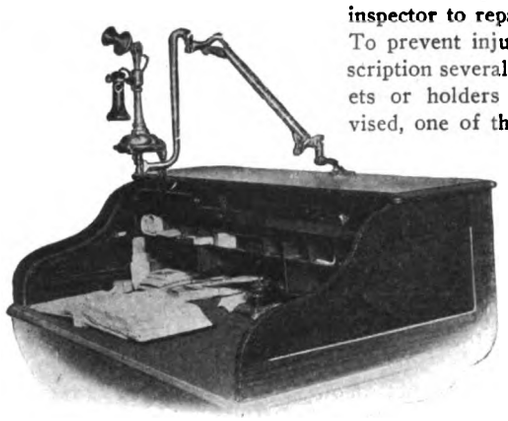
IN THE MANUFACTURING FIELD

"SUCCESS LIES IN THE KNOWLEDGE OF OUR TOOLS"

A NEW TYPE EQUIPOISE HOLDER.

MAINTENANCE charges upon desk stands are said to be higher than those for any other part of a telephone equipment. They are easily knocked over, the cords get twisted and broken and the result is a need for frequent trips of the inspector to repair the damage. To prevent injuries of this description several types of brackets or holders have been devised, one of the most efficient being the Equipoise holder. Two of the latest patterns of this device are herewith illustrated. A novel feature of their construction is the use of a spiral spring contained within the tubular arm. This spring is designed to compensate for the weight of the telephone, enabling it to be placed in any desired position in a vertical plane. The entire mechanism is so constructed as to secure the maximum range of adjustment, not only by means of joints, but by the insertion of sections when necessary to increase the length of the arm. The lower tubular support is fastened by means of a swivel joint to a bracket for attachment to a desk, and the desk stand holder is fastened to an arm which allows of its being turned around without moving the tubular support. A receiver hook is provided upon which the receiver can be placed when it is desired to hold a call, thus preventing it from being in the way or hanging by the cord.



The Equipoise holder mounted on roll top desk.

The roll-top desk pattern is the latest design. Fastened to the top of the desk it places the telephone within easy reaching distance of the user, who can adjust it for his convenience by pulling it down the required distance. When not in use it swings clear of the top. Another interesting feature of this bracket is its adaptability as a wall support. When used for this purpose in conjunction with a desk stand it offers an excellent substitute for a wall instrument. It is much more flexible in adjustment, as the height of the transmitter can be regulated to fit the exact requirements of the user.

This holder is furnished with an oxidized finish unless otherwise specified, although it can be secured in nickel plate without any additional cost. Further information can be obtained by addressing the Oliver Manufacturing Company, Philadelphia, Pa.

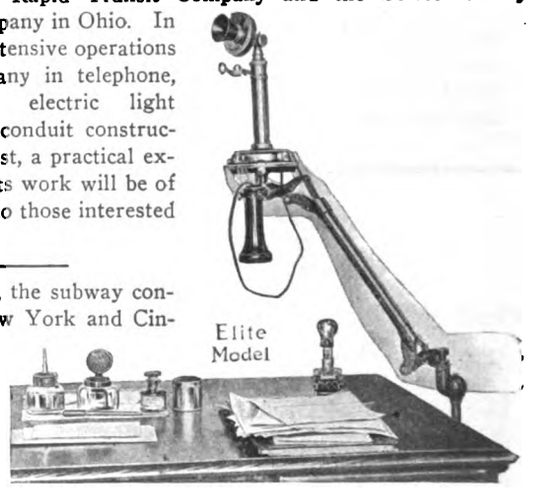
THE LEEDS & NORTHRUP COMPANY, of Philadelphia, exhibited its Decade portable testing set and new type portable galvanometer in addition to other electrical measuring instruments at the convention of the Pennsylvania Independent Telephone Association.

THE BAIRD MANUFACTURING COMPANY, 40 Michigan street, Chicago, Ill., is mailing to the trade a humorous postal card which draws attention to the merits of the Baird secret service system. Two short poetical verses describe the art of listening in as applied to Miss Rubber, who we are informed listened on the line all the morning and spent the afternoon repeating the secrets she had heard to her less fortunate friends. The artist has depicted her in a pleasing and characteristic attitude, and one can readily imagine the feeling of consternation which she would be subject to if her pet diversion of "rubbering" were taken away from her.

THE COLONIAL SELLING COMPANY, 3 W. 13th street, New York was represented by its president, Harvey A. Gage, at the recent New York Business Show. This firm handles an extensive line of office specialties, several of which pertain to the use of the telephone. It is New York City representative for the Equipoise Holder and the Camden Telephone Pad. This holder, which has been on the market for several months, has been much improved in design and is made in two styles, both of which were shown. The Camden Pad is a scratch pad for recording appointments and calls by telephone, and is provided with a frame by which it can be attached to desk or wall instruments. A decidedly amusing novelty which this firm exhibited is termed a 'Phone distractor. It consists of a metal pincushion mounted on ball bearings so that it can be easily revolved. Its object is to distract a person's attention whilst waiting at a telephone and thus prevent him marking the desk with a pencil or doing other objectionable things.

THE WESCO SUPPLY CO., of St. Louis, Mo., reports a steadily increasing business in its new type magneto switchboard, and during the past 30 days it has secured orders for switchboards to be installed at the following points: Staunton, Ill.—300 line switchboard with 250 series drops installed. St. Clair, Mo.—100 line switchboard complete with 100 series drops. Lometa, Tex.—100 line switchboard with 90 series and 10 bridging drops installed. Jonesboro, La.—A complete 100 line switchboard fully installed with series drops and 50 series telephones. Also smaller switchboards for Homewood, Miss.; Melrose, Ky.; Stamps, Ky.; Humansville, Mo., and Terre Haute, Ind.

THE STANDARD VITRIFIED CONDUIT COMPANY, 39 Cortlandt street, New York, will be among the exhibitors at the Electrical Show to be held in Madison Square Garden from December 12 to 23d. This company furnished all of the third rail insulators for the Interborough Rapid Transit Company for use both on the elevated and on the subway, and also supplied material for the Brooklyn Rapid Transit Company and the Scioto Valley Traction Company in Ohio. In view of the extensive operations of this company in telephone, railway and electric light underground conduit construction in the East, a practical exploitation of its work will be of special value to those interested in this line.



Equipoise holder, showing method of holding line during temporary absence.

G. M. GEST, the subway contractor of New York and Cincinnati, has been awarded the contract for the construction of a complete subway system at Chattanooga, Tenn., for the East Tenessee Bell Telephone Commpany. Active work on construction of this contract was commenced this week and is to be rushed to a speedy conclusion. This is the first

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conduit work installed in the city of Chattanooga, and the system will be a large one.

THE AMERICAN BOOK BRACKET COMPANY, of Philadelphia and New York, exhibited at the business show recently held in Madison Square Garden its telephone directory bracket and combined desk stand holder and book holder. The exhibit was in charge of J. E. Nachod, the New York manager, and F. P. Deemin, of Philadelphia, general manager of the company. The firm reports large sales of these devices resulting from its exhibit. exhibit.

TEST SET FOR TELEPHONE MEASUREMENTS.

THE best results in testing for telephone troubles and regular electrical measurements in a telephone plant should be obtained by instruments especially designed for this purpose. As most of our readers know, the Willyoung and Gibson Company has for some time past devoted a great deal of attention to this class of work

Of its best known and most widely used instruments is its portable testing set of which there have been three separate types, viz., the "Model K," the "Universal" and the "Western Union." The first is the oldest, and used largely by many of the old line telephone companies as well as by the United States War and Navy departments; the second is an "all switch" set, while the third is the officially adopted set of the Western Union Telegraph Company. This set has also been adopted by the Bell Telephone Company, Ltd., of Canada.

The "Jr. Western Union" portable test set.

To meet the demand for an all round set on the decade plan, embodying all the good *working* qualities of previous sets but at less cost the "Jr. W. U." set has just been put upon the market. This set has been designed along the lines of the "Standard W. U. testing set," and has a very similar "layout," but with all parts such as bars, blocks, etc., smaller and lighter. The coils are of smaller wire and the spacing of blocks more contracted. Nevertheless the insulation and other electrical qualities are good and may be relied on. The construction is thoroughly substantial and durable, and the finish good.

(1) This set will measure resistance within very wide limits (*note the two* 10,000 coils of bridge). (2) It will accomplish the Murray and Varley "loop" tests for the *location of grounds, crosses, etc.* In changing from one loop test to the other all connections are made by the shift of but one plug in the group of blocks marked "loop." (3) It will measure insulation by the direct deflection method. (4) Can be used as a plain resistance box. (5) Galvanometer may be used separately. (6) May be used as a potentiometer to check an ammeter or voltmeter. (7) Will measure one E. M. F. in terms of another. (8) Will measure internal resistance of batteries. (9) Will measure self-induction. (10) May be used as a handy test instrument generally.

The galvanometer is of the D'Arsonval type and is claimed to be unaffected by electrical, magnetic or mechanical disturbances and has a sensitiveness of from 1½ to 2 megohms per volt; posts are provided for any outside galvanometer should even greater sensitiveness be needed. The battery is of five cells, giving about 7.5 volts, and provision is made for the substitution of an outside battery. The bridge coils are 1, 10, 100, 1,000 and 10,000 on each side, thus giving a very wide range, while there are four rows of rheostat coils, viz., 10 units, 10 tens, 10 hundreds and 10 thousands. The total weight is 9 pounds and dimensions 10⅝ inches by 6 inches by 5 inches deep.

Interested readers may secure circular 500-3A for the asking, and information regarding other telephone test instruments, by addressing The Willyoung & Gibson Company, at 40 West 13th street, New York City.

THE WESCO SUPPLY COMPANY, St. Louis, Mo., is distributing its new bulletin No. 65, which describes the Wesco "Ideal" telephone, which is a magneto instrument with the central energy type of cabinet. This instrument is a slight modification of the old Wesco "Ideal" cabinet, as designed and originally placed on the market by the Wesco Supply Company four or five years ago. The awakening of the trade to an appreciation of the advantages of this type of cabinet has caused this company to again place it upon the market, and the numerous requests for information and the large number of sample orders already received for it indicates that this telephone will without doubt be a popular type of instrument in the future.

THE FARR TELEPHONE CONSTRUCTION AND SUPPLY COMPANY, Chicago, Ill., has recently issued a little booklet describing its extensive line of telephones. Five different types of wall instruments are listed and illustrated and a full description given of the No. 11 desk instrument. Photographs of the sales and managers' office are included, together with several good arguments relative to the business of the company. The new type transmitter and receiver are carefully described and illustrated. This booklet will be mailed by the manufacturers to all parties interested.

THE STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY, of Rochester, N. Y., and Chicago, Ill., has issued a new booklet descriptive of some of its apparatus. It is a very well designed piece of advertising literature, entitled "Listen," which contains a brief outline, with illustrations, of the advantages of a private telephone equipment. It touches upon the important features of a private branch exchange or intercommunicating system as manufactured by this company, among which may be noted the intercommunicating portable desk telephone or business telephone; the combination telephone, which, as is stated, is suitable for the banker, and portable desk telephone for the merchant's use. A private branch exchange switchboard cabinet is claimed to be one of the company's most popular styles. It is finished in quartered or golden oak, or mahogany. Other interesting illustrations of apparatus are found in this artistic and tersely written booklet, which the company will mail to all persons interested.

THE ELECTRIC APPLIANCE COMPANY, Chicago, Ill., and San Francisco, Cal., is distributing a decided novelty in the way of a mailing card. On the back of the card there is an illustration of one side of a telephone showing the receiver on the hook. The front part of the hook forms a catch to hold the folds of the card in position. Withdrawing the receiver from the hook exposes the inner portion of the device, which is used to describe the E. C. P. condenser manufactured by this firm. This card will be mailed to all parties interested upon request.

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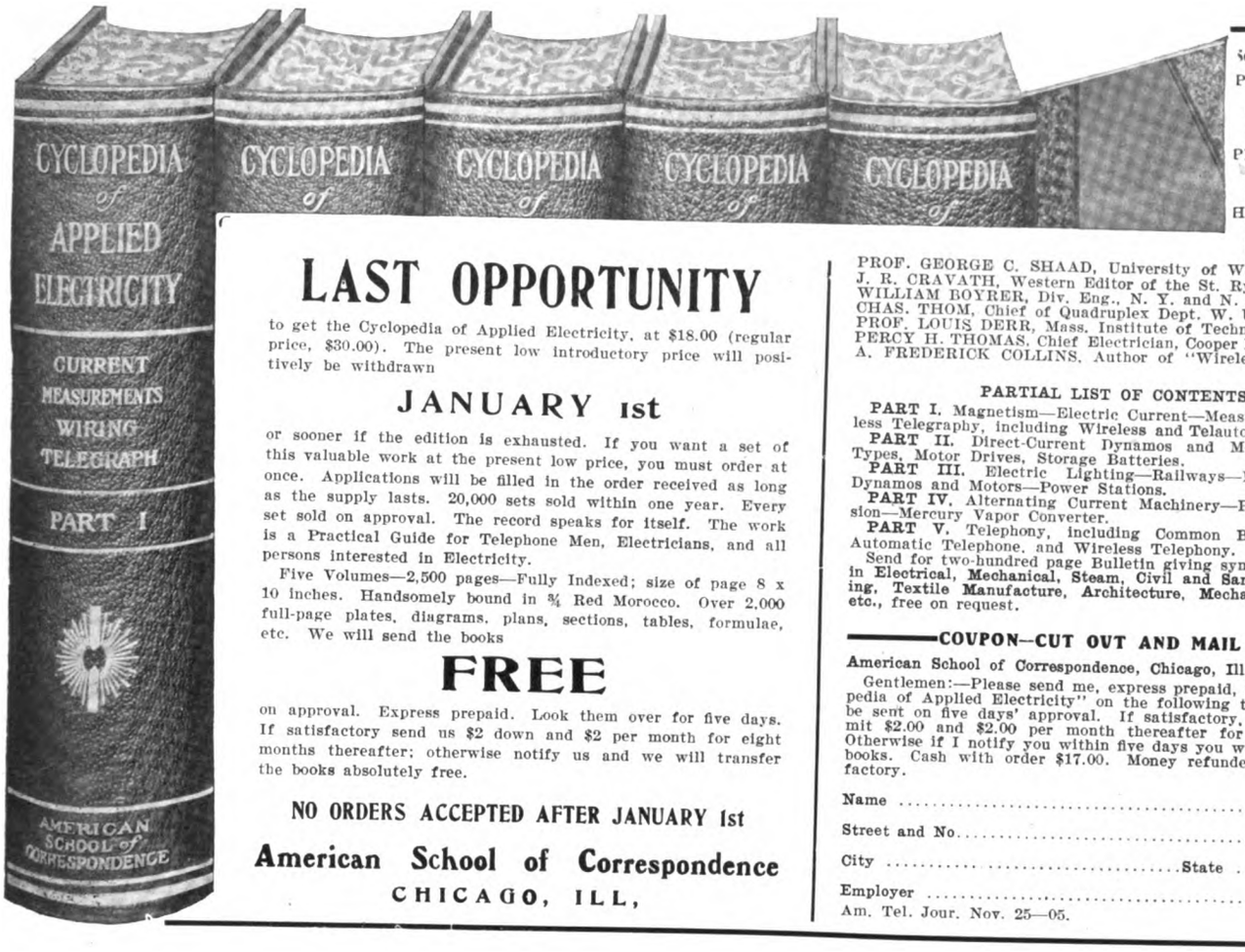

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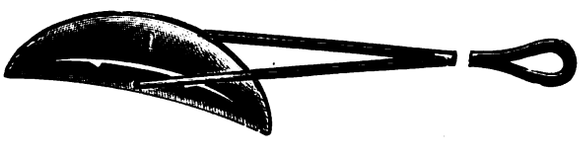

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FINANCIAL.

DETROIT, MICH.—The Home Telephone Company, recently organized to build an Independent telephone exchange in Detroit, has increased its capital to $5,000,000.

NEW LEXINGTON, O.—The Perry County Telephone Company, New Lexington, has increased its capital stock from $25,000 to $50,000.

FRANCHISES.

MARYSVILLE, CAL.—The Independent Telephone Company of Wheatland is asking for a franchise at Marysville.

WEST PALM BEACH, FLA.—Dr. J. E. Liddy, West Palm Beach, has applied for a franchise in that city.

GREENVIEW, ILL.—A franchise has been granted the Independent Telephone Company by the village board of Greenview to construct and operate a telephone business in that village. Work on the line will begin at once.

SPARLAND, ILL.—The Lawn Ridge Telephone Company has made arrangements with the village council, whereby it will be able to enter Sparland.

SPRINGFIELD, ILL.—The Egan Electric & Telephone Mfg. Company has applied for a franchise at Springfield.

LACONA, IA.—The Lacona Telephone Exchange has filed articles of incorporation. Capital stock is $4,000. The principal stockholder is Samuel Oxenrider.

WELLINGTON, KAS.—The Winfield Telephone Company is asking for a franchise in Wellington.

MARSHALL, MICH.—The North Marshall Telephone Company has been organized with a capital stock of $1,000. Its principal office is to be at Cresco.

BOONVILLE, MO.—Sherman Winner has been granted permission to erect a telephone line.

SPRINGFIELD, TENN.—The city council has announced its intention not to interfere with the franchise granted the Home Telephone Company a year ago. The company will now commence its construction work at once.

TACOMA, WASH.—The Independent Telephone Company is to be granted a franchise in Tacoma.

COMBINATIONS.

DANVILLE, IND.—R. D. Stone, of Clayton, has purchased the stock of the Clayton Telephone Company. He will at once begin to put the system in good condition and will build new lines.

INDEPENDENCE, IA.—The Corn Belt Telephone Company has taken control of the Buchanan County system, including the exchanges at Independence, Aurora, Lamont and about fifteen other important toll stations.

MANCHESTER, IA.—The toll lines of the Interstate Telephone Company, extending from Dyersville to Hopkinton, Delhi, Delaware and Manchester, have been taken over by the Delaware County Telephone Company.

ELDON, IA.—The Eldon Independent Telephone Company has been sold to Ed. Ilton, of Cedar Rapids, for $20,000.

TAMA, IA.—The Tama Telephone Exchange has been purchased by Mr. W. C. Fidler for $11,000. He will make improvements and extensions to the plant.

NORTHVILLE, MICH.—The Northville Independent Telephone Company has been absorbed by the Peninsular Telephone Company, an Independent long distance company.

KANSAS CITY, MO.—The Kansas City Home Telephone Company has obtained the controlling interest in the Ottawa Independent Telephone Company. J. F. Byers will retain active management of the exchange, and U. S. Hannum will remain superintendent. The most notable effect of the change will be the installation of new equipment.

BROCKPORT, N. Y.—The controlling interest in the Brockport Telephone Company has been acquired by the Rochester Telephone Company.

DAUPHIN, PA.—The old Lykens Telephone line, from Gratz to Good Spring, has been sold by the United Telephone & Telegraph Company to the Dauphin & Schuykill Telephone Company.

ELECTIONS.

SOLON, IA.—The Solon Telephone Company has elected the following officers: Dr. J. P. Potter, president; M. T. Loder, vice-president; J. J. Fiala, secretary; M. A. Randall, manager.

NEW MILFORD, ILL.—New Milford will have a telephone system, a meeting having been held at which officers and directors were elected, and plans laid for construction work. T. W. Evans, president; T. L. Cleveland, vice-president; A. T. Chase, secretary and treasurer.

LESTERSHIRE, N. Y.—The Lester Telephone Company has elected the following directors: W. B. Twichell, H. A. Williams, A. S. Judd, C. H. Smith, Daniel Jackson, A. H. Moore and A. H. Andrews.

JACKSON CENTER, O.—The Jackson Center Telephone Company has elected the following officers: W. C. Henrich, president; Ed. Kreitzer and H. R. Piel, directors.

WESTFORD, PA.—The Westford Telephone Company has elected the following officers: J. H. Collins, president and manager; R. F. Blair, vice-president; H. D. Bennett, secretary; J. S. Beckwith, treasurer.

NEW COMPANIES.

DELMAR, DEL.—The Riverton & Delmar Telephone Company has been incorporated with a capital stock of $50,000. The incorporators are chiefly from Delmar.

MACOMB, ILL.—The Macomb Electric Construction Company has recently been organized with the following officers: President, C. M. Erwin; vice-president, D. P. Pennywitt; secretary, W. I. Savidge; treasurer S. E. Purdum. The officers have had a wide experience, and the company expects to do a large business, having already secured a number of important contracts.

WINCHESTER, IND.—The Winchester Telephone Company has absorbed the Parker City plant, with toll lines to Albany and Losantville, and a new concern has been organized, to be known as the Indiana Telephone Company. Maximum capital, $150,000.

SPRING VALLEY, ILL.—The Spring Valley Telephone Company has been incorporated with a capital stock of $10,000. The incorporators are E. M. Baysoar, S. H. Brakel, Chas. C. Knapp and Fred Grunther.

VANDALIA, ILL.—The Vandalia & Southwestern Telephone Company, Vandalia, Ill., has been incorporated with a capital stock of $15,000. Incorporators: A. J. Tedrick, T. J. Inman and N. T. Rodeker.

WILLIAMSFIELD, ILL.—The Williamsfield Trunk Line Telephone Company has been incorporated with a capital stock of $1,000. Incorporators: C. H. Pulver, J. A. Tucker, John B. Gale.

TERRE HAUTE, IND.—The re-organization of the Citizens' Telephone Company is practically finished. The deal for the site of the company's new building, to be used as the home of the company, has practically been completed.

PROLE, IA.—The Prole Farmers' Mutual Telephone Company has been incorporated with a capital stock of $1,800. Incorporators: Martin Deheck and others.

WINNIPEG, MANITOBA.—Col. T. A. Potter, Mason City, is interested in the forming of the Independent Telephone Company of Manitoba. A bill will be brought up at the next sitting of the Manitoba Parliament to grant this company power to build local and long distance exchanges in every town in the province. G. A. Stewart is solicitor for the applicants.

ILLMO, MO.—The Illmo-Edna Telephone Company has been incorporated.

CASCADE, MONT.—The Cascade Telephone Company has been incorporated with a capital stock of $3,000. Incorporators: C. H. Austin, R. P. Thoroughman and W. J. Bickett.

CORTLAND, NEB.—The Indian Creek Telephone Company has been organized at Cortland by the election of the following officers: H. M. Huestis,

NEWS—WANTED

THE matter contained upon the Message and Operating Field pages of this paper is contributed largely by our special correspondents. We believe, however, that there are many valuable items of telephonic interest which are never brought to the attention of the public. There is no reason why this condition should exist, and the Editor, therefore, invites all telephone companies, and the officials of such companies, to furnish any information that they can consistently make public relative to financial statistics, new construction, elections, franchises and personal items.

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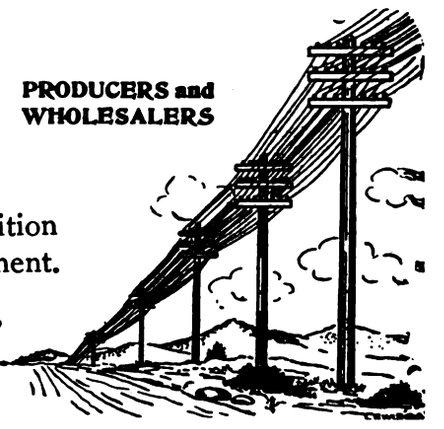

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THE WEEK'S MESSAGES

been incorporated with a capital stock of $2,500. Incorporators: T. H. Dreher and G. A. Baxter.

SPRINGFIELD, TENN.—The Springfield Home Telephone Company has been incorporated with a capital stock of $7,000. Incorporators are John McMurray, A. L. Dorsey, B. C. Moore, G. S. Moore, Thomas Pitt, H. T. Stratton, Jr., and H. C. True.

DOVESVILLE, VA.—The Dovesville Mutual Telephone Company, of Dovesville, Rockingham Co., has been incorporated with a capital stock of $5,000. President, Hiram May; vice-president, B. J. Smith; secretary, L. P. Souder; treasurer, S. G. Wittig. The company will operate about seventy miles of telephone line.

DREWRYVILLE, VA.—The Courtland Emporia Telephone Company, Drewryville, Southampton county, Va., has been incorporated with a capital stock of $1,000. Incorporators: D. B. Drewry, president; P. R. Pope, secretary and treasurer, of Drewryville.

PERSONAL.

CLYDE ACKLEY has been appointed manager for the Bell Company at Anaconda, Mont.

CHARLES H. CLAYTON has accepted the position of local manager for the Southwestern Telegraph and Telephone Company at Texarkana, Tex.

J. K. JOHNSON has been appointed general manager of the Tuscarawas, Ohio, Home Telephone Company.

A. KRATZ has been appointed manager of the Gallipolis, Ohio, Telephone Company.

HARRY LARHAM has been appointed district manager of the Inter-Ocean Telephone Company, at Pittsford, Fairport and Dispatch, N. Y.

BOYD LITTLE has been appointed manager for the local telephone company at Ennis, Tex.

HUGH McKENZIE has been appointed manager of the local telephone company at Sleepy Eye, Minn.

D. E. POWERS has been appointed to a position in the traffic department of the Wisconsin Telephone Company.

G. L. STEARNS has been appointed local manager at Albert Lea for the Northwestern Telephone Company.

R. BRINK TYLER, formerly with he Stromberg-Carlson Telephone Manufacturing Company, has recently taken charge of the Southern department of the Automatic Electric Company, with headquarters at Louisville, Ky.

MISCELLANEOUS.

NEW CASTLE, IND.—A meeting of representatives of the Independent telephone companies, recently held in this city, resulted in the perfection of an organization with the election of A. C. Lindemuth, of Richmond, president, and Charles Phelps, of New Castle, secretary-treasurer. The towns having representatives at this meeting were Richmond, Cambridge City, Mt. Summit, Spiceland, Springport, Sulphur Springs, New Lisbon, Hagerstown, Liberty and New Castle. The organization is for the purpose of bringing into closer relationship Independent telephone men of this section for interchange of service and general accommodations.

CLEVELAND, OHIO.—The Cuyahoga Telephone Company, of Cleveland, claims to have more telephones in operation than any other Independent telephone company in the country. On November 1 it had 19,494 telephones connected in its exchange and at the present rate of gain should have 20,000 by the end of the year.

RAVENNA, OHIO.—The Portage County Telephone Company now has upwards of 2,000 telephones in its system. These are distributed as follows: 740 are in Ravenna, 670 in Kent, 230 in Mantua, 210 in Garrettsville, 65 in Windham and 75 in Hiram.

New Construction in the Field

BIRMINGHAM, ALA.—The Home Telephone Company is to begin the reconstruction of its system.

MOBILE, ALA.—The Home Telephone Company is to begin the work of reconstructing the system of the Eastern Shore Telephone Company, which was absorbed by the Home Company some weeks ago. Cable lines are to be established throughout the country and exchanges opened at Bay Minette and Fairhope.

LOS ANGELES, CAL.—The United States Long Distance Telephone Company has recently completed a new toll line between Los Angeles and San Diego.

SWEET, IDAHO.—The Independent Telephone Company is to build a line to Lardo.

NEW BADEN, ILL.—The Looking Glass Prairie Telephone Company will build a line from New Baden to Mascoutah and later extend it to Fayetteville and Freeburg.

PEORIA, ILL.—The completion of the new telephone line between Monmouth and Macomb has been effected. The line is the joint property of the Illinois Western Telephone Company at Macomb, the Roseville Telephone Company and the Monmouth Telephone Company. It is quite probable that the line will be extended to Peoria in the near future.

FT. DODGE, IOWA.—A new toll line has been built by the mutual companies between this point and Sioux City. It will be extended to Dubuque in the near future.

WOODBINE, IA.—The Woodbine Telephone Company is running a line from Woodbine to Honey Creek.

MARION, KY.—The Paducah Home Telephone Company is to reconstruct its system at Marion. It is estimated that something over $15,000 will be spent in improvements.

ELLSWORTH, ME.—The Union River Telephone Company is building a line to Ellsworth Falls.

FARMINGTON, ME.—The Franklin Farmers' Co-operative Telephone Company is building a line from Chesterville through Vienna, New Sharon, West Farmington and Farmington Falls to this point.

PALMYRA, ME.—The Hartland and St. Albans Telephone Company is to build a line to East Palmyra.

BRAINERD, MINN.—The Cass County Mutual Telephone Company has completed its new line from Staples to Leader, Ellis and Esterday and connects with the Motley line.

HARDWICK, MINN.—R. A. Heckt and others propose putting in a telephone exchange at Hardwick, Minn.

SAUK CENTER, MINN.—The Pleasant Valley Telephone Company is to construct a line south from the city of Sauk Center, connecting the farming district in Pleasant Valley with the city.

WINONA, MINN.—The Winona Telephone Company is constructing a new line in the Cedar Creek Valley.

STEINAUER, NEB.—The Steinauer Telephone Company is extending its lines in all directions.

DELAVAN, N. Y.—The Interocean Telephone Company is to build a line from Springville to Delavan, via Yorkshire.

DOLGEVILLE, N. Y.—The Interstate Telephone Company is to make extensive improvements in the city of Dolgeville.

FORT ANN, N. Y.—The Granville Telephone Company is to build a line from Fort Ann to South Bay.

RICHMONDSVILLE, N. J.—The Charlotte Valley Telephone Company is extending its lines to this point.

ANNAPOLIS, OHIO.—The Annapolis Telephone Company is repairing its line between Annapolis and Unionport.

GARNETTSVILLE, OHIO.—The Portage County Telephone Company is rebuilding its exchange at this point.

MIDDLE BASS, OHIO.—The New Ottawa County Telephone Company is to build a line from Middle Bass to North Bass.

MT. BLANCO, OHIO.—The Point Rock-Wilkesville Telephone Company is to build a line from Mt. Blanco to Prattsville.

STEUBENVILLE, OHIO.—The Phoenix Telephone Company will commence the construction of a line from this point to Bloomfield at once.

WINDHAM, OHIO.—The Windham Telephone Company is constantly increasing the number of its subscribers. It contemplates additions to the plant in the near future.

ECHO, ORE.—The Butter Creek Telephone Company is extending its lines.

PENDLETON, ORE.—The Butte Creek Telephone Company is planning to extend its system to Heppner.

McEWIN, TENN.—Dr. Robertson and P. J. Fuqua are building a telephone line from McEwin to Hurricane Creek.

ELDORADO, TEX.—B. E. Earle is about to install a telephone plant at Eldorado.

MEDICAL LAKE, WASH.—The Medical Lake Telephone Company is to make many important improvements and extensions.

BENWOOD, W. VA.—The National Telephone Company is to construct a line from Benwood to Bellaire.

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100 % GOOD

TO EXCHANGE MANAGERS

Two years ago we placed the PLATINUM ELECTRODE transmitter on the market. This transmitter was originated and developed by us. Every exchange manager who has made a careful test of this transmitter has found it far superior to any carbon electrode transmitter.

PLATINUM has valuable qualities possessed by no other substance that makes it an ideal material for electrodes. A few of the good qualities of PLATINUM are:

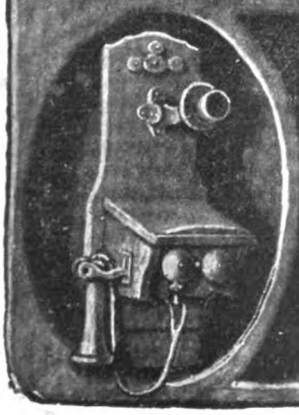
PLATINUM is unaffected by the electric arc and will not disintegrate, which carbon will do.

PLATINUM offers an exceedingly low surface resistance, making it possible to put all of the resistance into the granular carbon, where it is actually required.

The PLATINUM ELECTRODE makes perfect articulation possible.

The TRANSMISSION of the platinum electrode transmitter is perfect over long and short lines.

The platinum electrode transmitter will not fry or pack, even when submitted to excessive current. This transmitter is made for common and local battery service.



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We will send you 10 Bridging Telephones, **our best 5 Bar Generators, 1600 Ohm Ringer Coils, Solid Back Transmitter, complete for $105.00** on 30 Days' Trial.

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1000 TELEPHONES ON HAND Orders Filled and Shipped Same Day Received.

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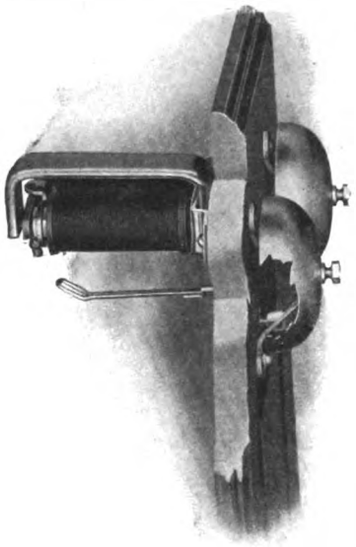
MONARCH APPARATUS

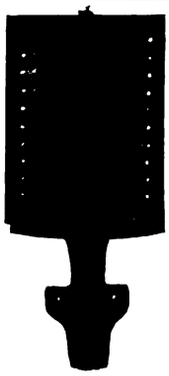
THE GONG DAMPER



The Monarch Gong Damper is a simple, practical device for compact type telephones. Its purpose is to stop the vibrations of the ringer gongs upon the removal of the receiver. A bent wire lever rests upon the switch hook when the door of the cabinet is closed, while two prongs of this lever extend through the woodwork to the inside of the gongs. The removal of the receiver raises the hook and the damper lever. This action tilts the two prongs so that the leather discs upon their ends come into contact with the gongs and deaden their vibrations. There are no electrical connections, and the device is so simple it is almost impossible for trouble to appear.

All Monarch Compact Type telephones are equipped with Gong Dampers. The new catalogue illustrates and describes this feature, as well as all other Monarch conveniences. A copy will be sent upon request.

MONARCH TELEPHONE MFG. CO., 10-16 SOUTH CLINTON STREET CHICAGO, ILL.



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A CABLE TERMINAL OF MERIT

If you use aerial cable, you undoubtedly use the multiple tap system of distribution by means of cable terminals.

THE HALL CABLE TERMINAL is representative of what a cable terminal should be. It was designed by an expert; and from practical as well as theoretical standpoints, is unexcelled. It affords ample protection against lightning and sneak or heavy currents. Plenty of room is provided to make connections, and yet the device is compact.

For side bracket use it is made in varying capacities from 10 to 50 pairs, and for pole tops in sizes from 25 to 100 pairs. If you have seen it, you are using it. If not, then you had better send for a sample before placing your order elsewhere.

SOLE MANUFACTURERS

THE MOUNTAIN STATE ELECTRICAL CO., WHEELING, W. Va.

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DEAN TELEPHONE APPARATUS

Removable Lever Hook Switch

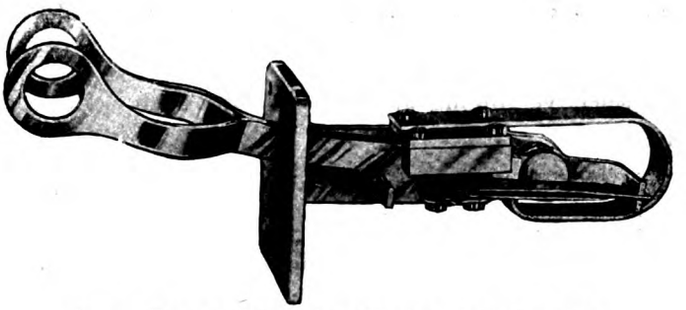

Fig. 1. Dean Self-Contained Hook Switch, Complete.

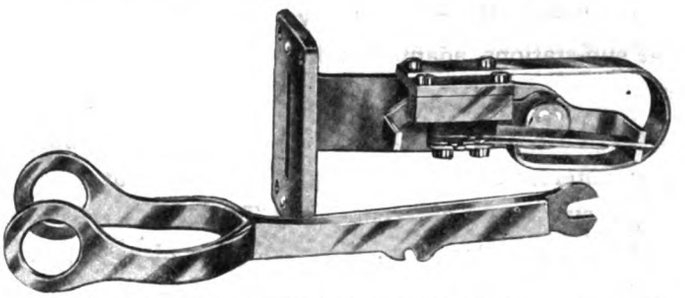

Fig. 2. Dean Self-Contained Hook Switch with Lever Removed.

A Hook Switch with removable lever is one of the many **original** devices brought out by us. This switch is made with a projecting hook lever which can be readily withdrawn from a telephone containing the hook switch, and thus prevent breakage as well as reduce the space occupied in shipping and in the stock room.

When the lever is once inserted it is locked in place by a spring catch and then **can only be removed by opening the lid of the telephone box** in order to get at the release. Simple yet secure.

The incorporation of this removable lever feature does not complicate our hook switch. On the other hand, it eliminates the usual insecure method of fastening by means of screws, nuts or pins.

The complete Dean Hook Switch is entirely self-contained, being mounted by means of four screws pasing through the escutcheon. Thus, absolutely no dependence is placed on the telephone cabinet for holding parts in their relative operating position. A very desirable feature.

All of our wall type telephones are provided with this type of Hook Switch.

THE DEAN ELECTRIC COMPANY
ELYRIA · OHIO

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THE

Kellogg Switchboard & Supply Co.'s

FOUR PARTY LINE PATENT

Issued January 10, 1905, No. 779,533.

Does not cover ALL selective ringing systems, as many such systems embody features that this patent does not contain.

For example, the Leich four party line system, patented subsequent to the Kellogg system, September 5, 1905, has two bells legged to ground from each line conductor and uses the earth as a common return for the ringing current. (See Fig. 5, Leich patent.) The Kellogg patent covers broadly such a system, having A METALLIC RINGING CIRCUIT and without grounds at the sub-station.

Again, the Leich system does not employ a harmonic or tuned sub-station outfit. (See Leich patent, page 4, lines 25 to 33.) The Kellogg patent covers broadly a system using HARMONIC OR TUNED RINGERS at the sub-stations, adapted to be selectively operated by alternating currents of corresponding frequencies.

Again, the system OF THE LEICH PATENT does not selectively operate the bells by means of "high-and-low-frequency or different-frequency" ringing currents, but operates ALL the bells by current having the SAME frequency but of a different ELECTRICAL CHARACTER. (See Leich patent, page 4, lines 16 to 24.) A two-frequency system is being placed upon the market as the "Leich system," but this system or any other system employing DIFFERENT FREQUENCIES for operating the bells, IS NOT COVERED BY THE LEICH PATENT. The Kellogg patent covers broadly a system in which the different tuned ringers are selected by means of alternating currents of DIFFERENT FREQUENCIES.

The Kellogg patent covers broadly ALL systems that are METALLIC, HARMONIC, AND USE HIGH AND LOW FREQUENCY CURRENTS, and all systems using these features ARE INFRINGEMENTS OF THE KELLOGG PATENT, AND WILL BE PROSECUTED.

Copies of the Kellogg patent or any other four party line patent will be furnished upon request.

Kellogg Switchboard and Supply Co.

CHICAGO, ILL.

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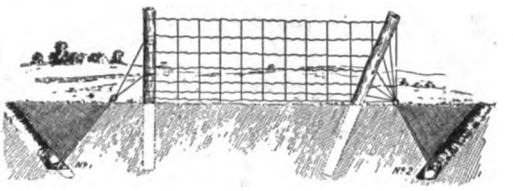

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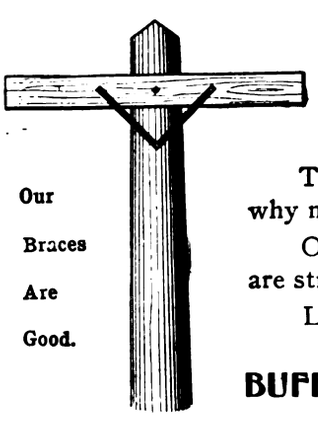

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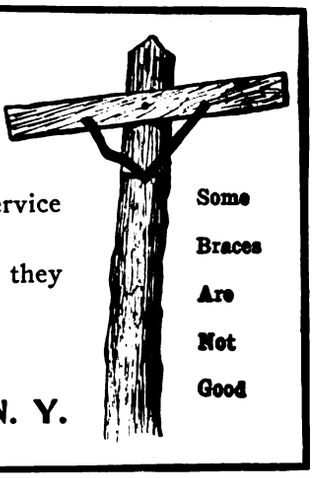

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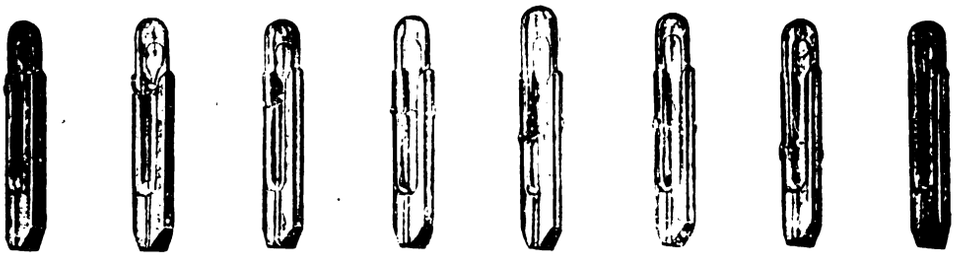

4-V .2-Amp. | 4-V .4-Amp. | 10-V .2-Amp. | 16-V .2-Amp. | 20-V .3-Amp. | 24-V .3-Amp. | 40-V .5-Amp. | 48-V .6-Amp.

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1.—OUR TIPLESS LAMPS ARE UNEQUALED. The lamps are rounded off on the front end, thereby forming a small but effective convex lens which focuses all the light rays into the most desirable position.

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TABLE OF VOLTAGES.

Voltage.	Approximate Candle Power.	Amperes.
3	.2	.2
4	.2	.2
4	.2	.4
5	.2	.15
6	.2	.15
10	.2	.1
12	.2	.1
14	.2	.1
16	.2	.1
20	.3	.1
24	.3	.075
30	.3	.085
40	.5	.085
48	.6	.075

We also manufacture the old-fashioned tip lamps, and can sell them at a lower figure than any other lamp. Our prices for the tipless lamp are the lowest on the market.

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AUTOMATIC INTERCOMMUNICATING 'PHONE for EXCHANGE CONNECTION

EXTREMELY SUCCESSFUL.
NON-INTERFERING TRUNK BUTTON.
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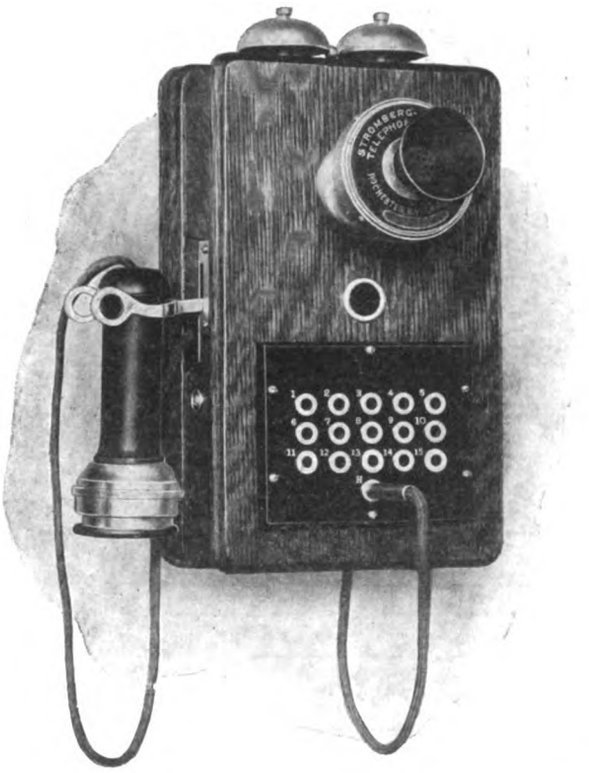

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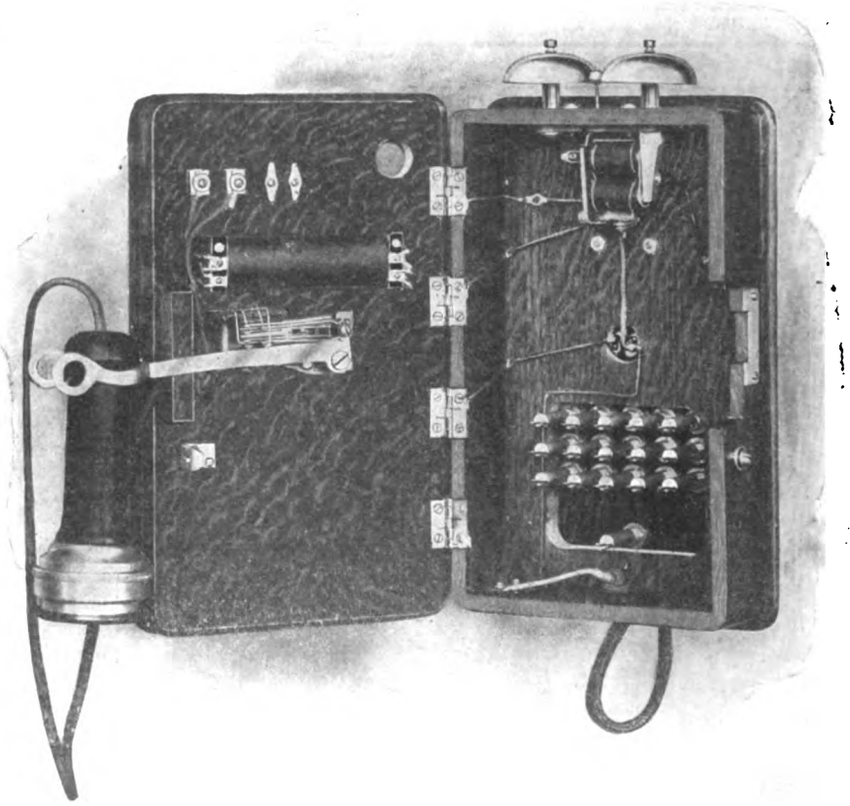
If you have not done anything with the Intercommunicating telephone system, you are neglecting a good field. One of our customers has connected nearly 100 of these systems to his exchange in less than two years, to say nothing of the regular Private Branch exchanges. Let us give you the benefit of our experience, gained in helping our customers do this.

There's nothing for you to lose and it would be remarkable if we could not help you some.

This is our standard Intercommunicating wall telephone. It is made up of standard telephone parts—long distance transmitter and receiver, platinum contact, hookswitch, etc., and has a capacity for 25 lines and one home jack. Each instrument is provided with an adjustable transmitter arm. We have several styles of desk and combination telephones, all of which are described in our Bulletin No. 13 B. Any telephone man will find the information in this bulletin valuable. We mail it free.



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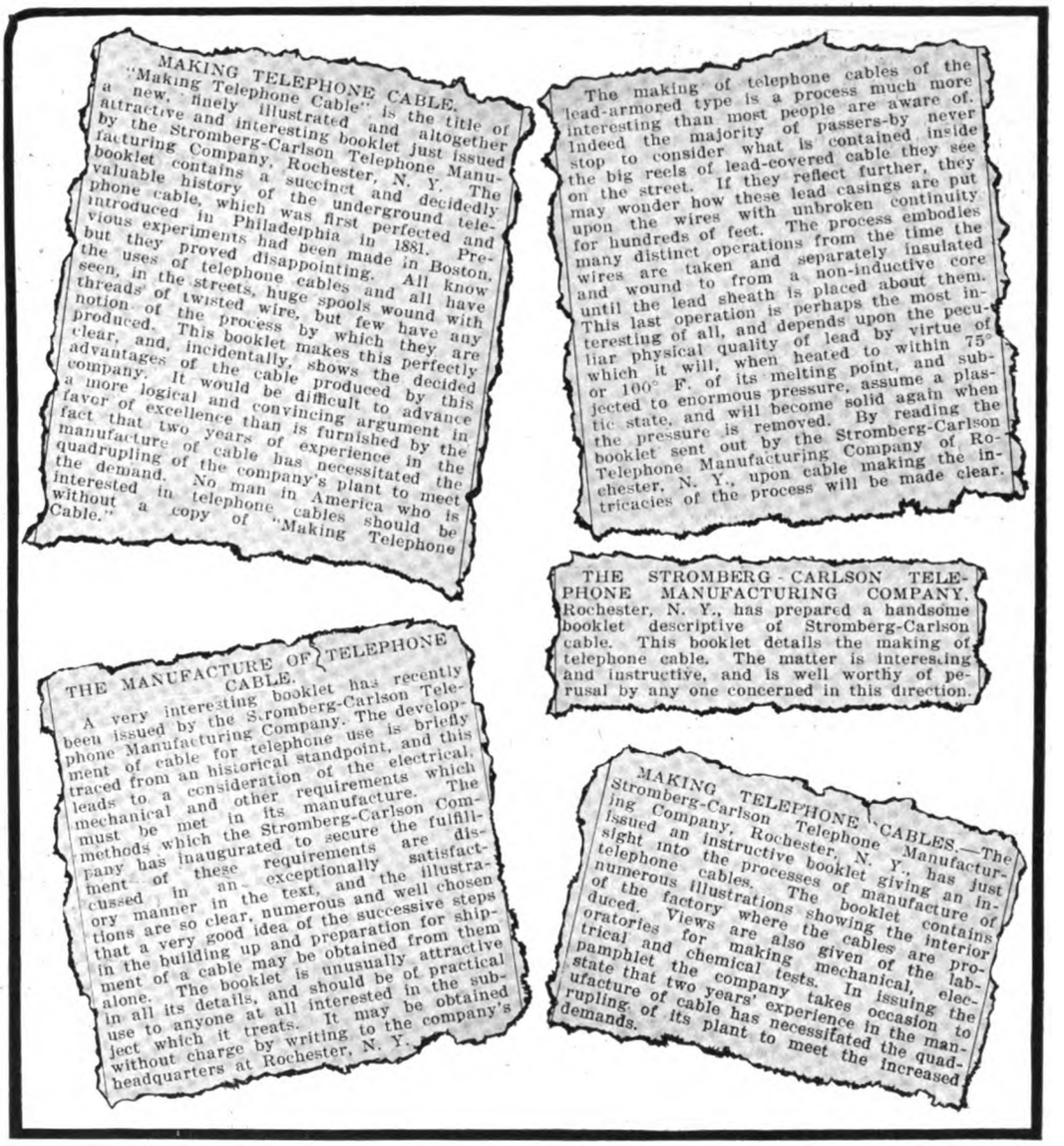

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IN LOS ANGELES, CALIFORNIA

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Total.....			19,300

Our automatic system adopted also in the following cities:

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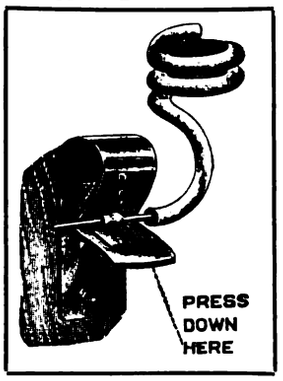
a manufacturer offered you, at a low price, a dandy long lived high amperage dry battery.

Supposing that in order to put all of the cost into the quality of the battery he had neglected to put on any binding posts.

Supposing that you had to tie the wires to the battery in order to make the connection.

Supposing that another manufacturer offered you at the same price a lower grade battery, but it had binding posts.



Supposing it came to a "show down," which would you take?

Why, the last, of course, because you would reason that what you saved by getting a better article for the money you would lose, and more, too, by the time it would take to make the connections and the trouble you would have with them after they were made. This applies to the

Fahnestock Spring Binding Post

when compared with the regular style of dry battery connector.

It would be cheaper for you to take a lower grade battery with Fahnestock spring binding post than a higher grade battery with ordinary connectors.

But you don't have to. The higher the grade of battery the more willing the manufacturers are to supply you with Fahnestock spring binding post. They realize that their battery must be high grade all around and they are quick to grasp anything that will make it so. Its only the cheap people that are slow.

Specify Fahnestock Spring Binding Post the next time you order batteries. The cost will be no more and you will get a better thing. If you don't believe this let us "show you" before you order.

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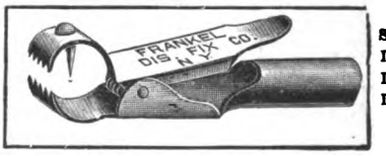

Sample dozens...$1.50 per doz.
Lots of 100....11.00 per 100
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GET out of that rut of skinning the wires—IT'S EXPENSIVE. THIS device will save both valuable time and material—THAT'S PROFIT.

The teeth grip the wire or binding post. The pin pierces the insulation and makes a perfect test connection.

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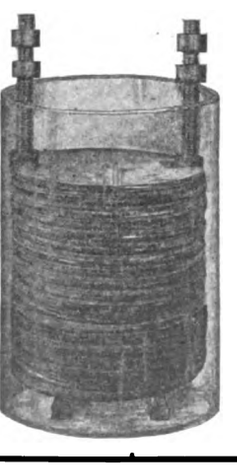

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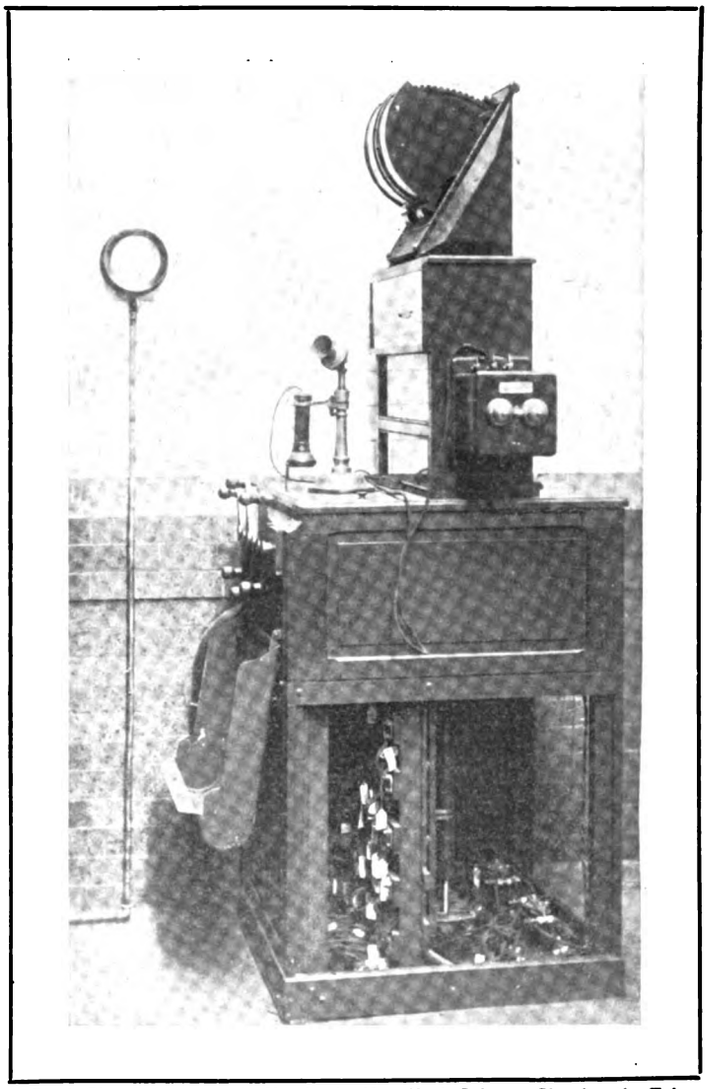
Heavy Telephone Traffic of Interborough Railway

By Robert G. White.

PROBABLY there is no large street railway in the world that handles a heavier traffic than does the Interborough Rapid Transit Company. Passengers are carried daily on its cars in numbers which run up into the millions. A large portion of this travel is through the Subway which extends from the Battery to Forty-second street and beyond that point divides into two branches, each of which conveys pasengers to the upper end of Manhattan Island. This division of the company's system has four tracks, two of which are used for local traffic and the other for express service. Trains are run every three or four minutes, and in the case of the expresses reach a speed of over 35 miles an hour. With such exceptionally heavy traffic conditions as these, it is self-evident that every precaution must be taken to prevent delays or accidents, otherwise there would be a thorough blockade of the system that would prove of the greatest inconvenience to the thousands of passengers who take this route, in preference to the slower means of locomotion afforded by the elevated and surface lines.

The control of this immense transportation problem is most effectively aided by the constant use of telephones. The telephone system employed is the most extensive ever devised for similar conditions as there are at present connected to its lines 780 sub-stations. These are located at the stations, signal towers, switches, yards, generating plants and offices, in fact not a point has been overlooked where the use of a telephone would be of the least advantage. All the departments have connections, and in many instances where service conditions are such as to require additional facilities, two or more telephones are employed at one location.



Block Signal Apparatus in Use in the New York Subway, Showing the Telephone as the Means of Communication.

The accompanying illustrations show views of the block signalling apparatus at the Spring street subway station. The quadrant-shaped devices at the top of the cabinet are volt and ammeters connected with the third rail to show the condition of the current at that point. Immediately below is a manipulation chart. Upon it are printed explicit instructions relative to the various signals and switches and their operation by the controlling levers. The middle panel contains a miniature semaphore. This is connected with the local signals of the express track and works in unison with them. An operator by watching the arm knows whether the main signal is set correctly or not. When it hangs downwards the track is clear for the passage of a train which, after passing, resets the semaphore and signal lights to the danger position. The lower opening contains reduced scale models of the switches at this point. Upon the front of the cabinet the manipulating levers are mounted. These operate make and break switches controlled by magnets. A sheet metal cover hinged along the base line is used to protect the mechanism from injury, and to prevent it from being tampered with by unauthorized persons. The interior of the case contains all of the terminals and controlling magnets, each of which is plainly tagged to assist in its being readily located. The dial shown on the wall indicates the air pressure which is employed to operate the signals and switches. Pressure is secured by means of electric pumps, and the opening and closing of the various valves is accomplished by the electrical mechanism above described. The telephone shown in the illustration, while not directly associated with this signal system, is so located that if it becomes necessary in the course of regular business for an operator to talk with a tower man or communicate with other points on the road he can do so in the most convenient manner.

The switchboard is located in the power house at Ninety-ninth street and Third avenue. It is a six-position board and is at present equipped with six hundred lines. From this point the distribution of wires to outlying stations is made by means of lead encased twisted pair paper insulated cables, laid in vitrified

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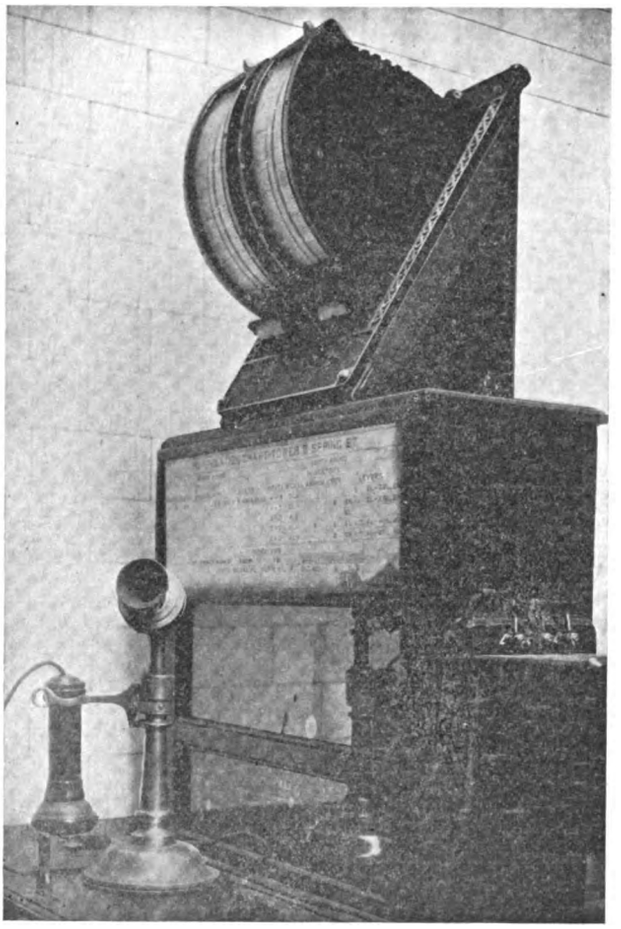
duct conduits. The cables vary in sizes to meet the different requirements, having capacities ranging from 15 pairs to 200 pairs each. The system is common battery, the current for talking purposes being supplied from a battery of twenty-two cells having a capacity of 50 ampere hours each. Motor generators are employed for charging purposes and Holtzer-Cabot alternating generators for furnishing the ringing current at a potential of 75 volts operating at 16 cycles per second. The connecting equipment consists of 15 pairs of cords at each position. With these cords are associated the usual ringing and listening keys and double supervisory lamps control the clearance of the circuits according to the usual practice of a lamp to each half of the cord circuit. The system is entirely local, having no outside connections. It is maintained and operated by the electrical department of the road, a competent corps of troublemen being always on duty.

A plant of this size is similar in general details to those giving service in small cities, except that traffic conditions are heavier. The ordinary routine of the business handled through this switchboard calls for an average of 8,000 connections per day, but this number is greatly exceeded when any event of more than ordinary importance occurs. In fact it is not an uncommon occasion when the number of connections is in excess of 10,000 for a period of twenty-four hours. A curve showing the traffic load would evidence a fairly steady condition with high peaks in the forenoon and afternoon. At these times the maximum number of calls per hour under normal conditions is in the neighborhood of 1,700. It is unlikely that any other private plant shows such a large volume of business or is subjected to such a heavy and continuous load.



Near View of the Signal Indicating Mechanism, Showing Measuring Instruments, Information Chart, Semaphore and Switches.

An analysis of the conditions which give rise to this state of affairs shows the extensive use of the telephone for every purpose requiring communication. Its field of activity is not limited to the services required of it by the managers, superintendents, or foremen of the different divisions, but it is at the disposal of all employees who have business to transact. Its functions, besides those of a purely commercial nature, can be best understood from a consideration of the different phases of railroad business. Highly important among these is the control of trains, as it involves the transmission of messages to car houses and points along the line. High speed operation requires a well developed scheme of communication which is as near perfection as can be possibly obtained. There must be no loophole for error, and it is evident that this can be best secured by a system which will place the operation of the road in direct control of the proper officials. This can only be obtained by the use of telephones, as any other plan requires the service of a third party. For emergency purposes this system is indispensable, as it enables the heads of the various departments to get into direct and instantaneous communication with the scene of an accident or delay, without the aid of an intermediary, as would be the case were the telegraph employed. The best regulated system is subject to failure at any time. It is then that the telephone demonstrates its superiority. Requiring no expert knowledge for its operation, it furnishes an ideal method of communication. Should a train be stalled between stations, messages can be sent to the ticket offices, to the switching points, to change the movement of the trains, and the department officials can be furnished with full details relative to the trouble.

This is but one illustration, but there are numbers of others which arise in the course of a day's business which require the aid of the telephone. It will therefore be easily understood why so many of the large railroads are introducing this method of communication, and it does not appear improbable that it will in the course of time become the chief means of communication, thereby supplanting the telegraph, the latter becoming the auxiliary. In this particular case the telephone exchange is indispensible. It furnishes a system of connections which places every department in constant relation with each of the others.

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Simplex Circuits*

By H. G. Greenwald.

IT may be required to place a way station for telegraphic service at some point betwen the terminal equipments. Usually this is accomplished as indicated in Fig. 5. The method consists in cutting the line as regards direct current by means of the 2-m. f. condensers. The telegraph instruments are placed between the two taps of the impedance coils which are bridged across the line. As condensers of 2 microfarads or more capacity allow the higher frequency voice currents to readily pass through them, there should be no interference or loss to either service due to the presence of such a station.

Possibly it becomes necessary to use more than one toll line to complete the telegraph circuit. The telegraph circuit may be carried from one line to another by use of the arrangement indicatd by Fig. 6. Study of the plan will demonstrate there can be no cross-ringing or other disturbance traveling from one line to the other.

Fig. 7 will give an idea as to the arrangement and connections of repeating coils, having middle taps brought out on both sides, so as to allow of the trunk line being, as regards telegraphic service, cut into two sections, thus making it possible to use the circuit for a part of its complete length for one telegraph circuit, and also use the remaining section for an entirely sepa-

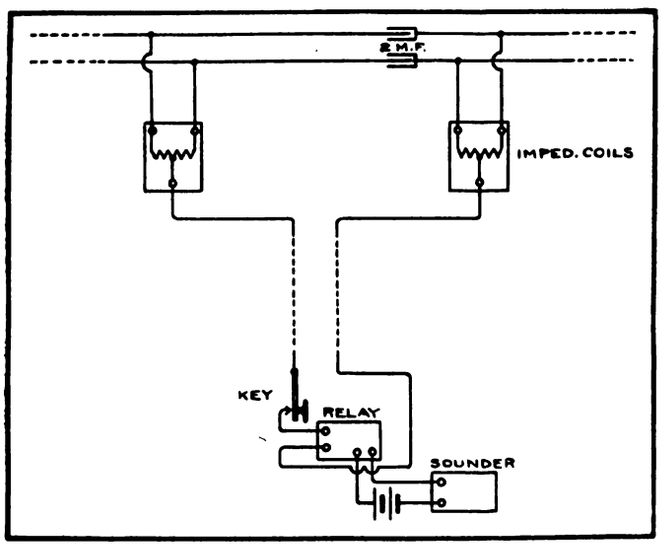

Fig. 5. Arrangement for telegraph instrument connected at way station on line.

rate telegraphic circuit. As far as telephonic communication is concerned the circuit would act as a continuous line over the entire length.

Fig. 8 represents a specimen simplex circuit embodying two toll lines and having four stations. The jack box equipment between C and D will be noted as well as the method of cutting in the way station at B.

All the foregoing description applies to arrangement of apparatus so as to form one telegraph and one telephone circuit over the one metallic circuit. It is possible to work with some success two telegraph circuits, in addition to a telephone circuit over the one pair of wires. Naturally one could not expect to realize the acme of success, especially for long distance work; at least not with existing methods. However, should the toll line be used for short distance work one would very likely not perceive much difference in the transmission in comparison to what may have been previously noted. The great disadvantage with this arrangement is due to the fact it is impossible to ring over the line without disturbing the telegraph equipment. Perhaps the only successful method of signaling that might be employed would be the substitution of a receiver in place of the usual drop and throwing a loud high frequency tone over the circuit, something similar to the effect produced in holding the receiver of a short-circuited magneto telephone very close to its transmitter. Again the operation of a buzzer in series with battery and the

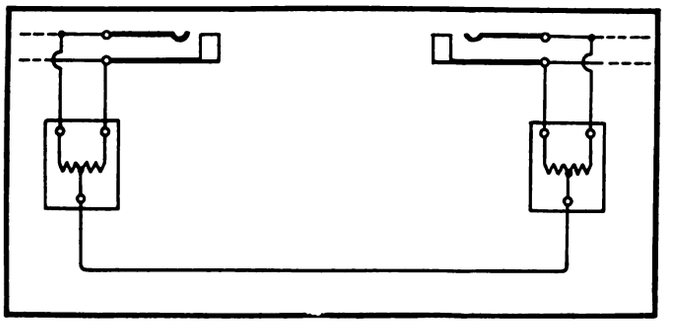

Fig. 6. Connection of two impedance coils to jacks and telegraph line for through telegraph circuit.

primary of an induction coil might produce in the secondary a suitable current for signalling provided the receiver is used in place of the line drop. If more than one line is so equipped, possibly a high and a comparatively low tone might be used for signaling; however, where there are more than two double equipped circuits, it is obvious that with a tone signalling arrangement certain confusion would result. In practice it is customary to obviate the difficulty in ringing on circuits having both sides in use for telegraphic service, by forwarding the telephone orders from one exchange to the other over a Morse circuit; in other words, all telephone messages are preceded by a telegraphic notification.

Fig. 9 is intended to show an arrangement of one end of a circuit equipped for allowing two telegraph circuits to be operated over one metallic telephone line, the other end being similar, except that battery may be omitted at the distant end. It will be noticed that the impedance coil in series with the telegraph equipment is of peculiar construction and winding, so as to separate the entire winding into two halves. The winding reverses at its middle point. This produces practically two separate impedance coils and by considering the comparatively high frequency of voice currents it appears that little is lost. On the other hand, when we consider the effect on the relatively slower telegraphic impulses these coils act as non-inductive resistances and readily allow the passage of telegraphic impulses. The large capacity condensers are used to absorb the sharp waves produced

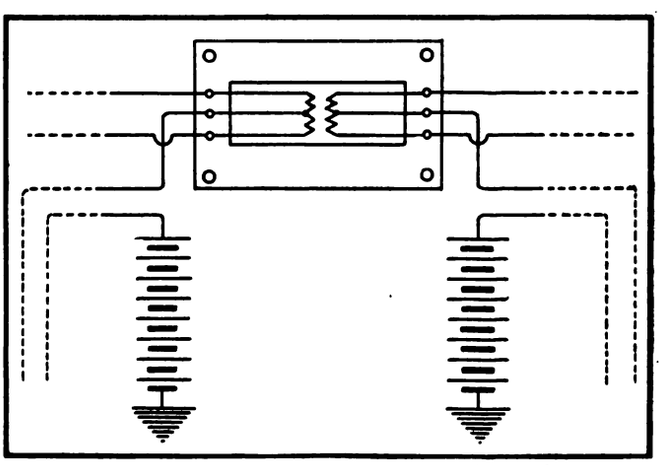

Fig. 7. Repeating coil connected to make line continuous for telephone transmission, with separate telegraph circuits.

on operation of the keys, so as to render the clicks less audible in the telephone receivers.

It is considered best, should the circuit equipped for simulta-

*Continued from the issue of Nov. 25th.

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neous telegraphy and telephony be paralleled by other circuits having terminals at the same point, to reserve the composite cir-

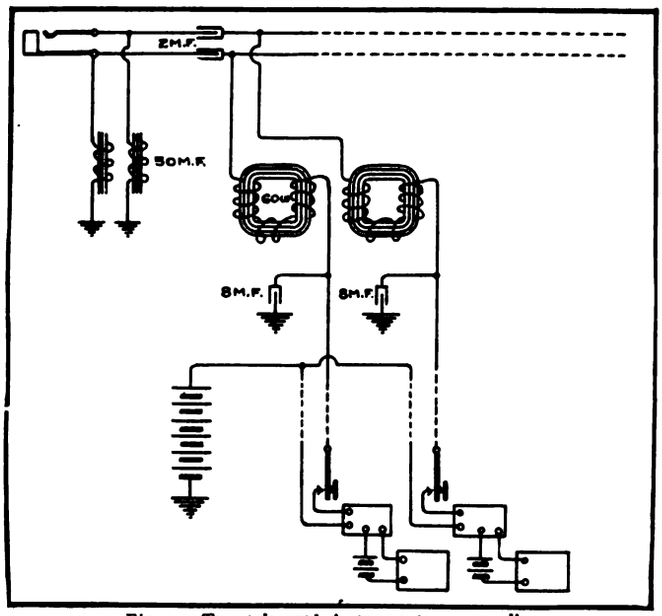

Fig. 9. Two telegraph instruments on one line.

cuit for use in connecting local subscribers between these two terminal points only, as these circuits are not to be expected to yield as good long distance service as the ordinarily equipped line. Hardly any difference in the transmissive qualities may be noticed on short distance operation. Should the distance be increased or two or three of these circuits be used in succession to reach the long distance point, the transmission would very likely suffer in a great degree. This is especially applicable to the lines in which repeating coils were used rather than impedance coils. Following this idea, it is well to use if possible the wires connecting one local board with a similar local board in a neighboring town, or possibly the order wires connecting the two exchanges, or in other ways to retain, as much as possible, only the regular equipped trunks or toll lines for long distance service.

ANNIVERSARY OF BIRTH OF BENJAMIN FRANKLIN TO BE OBSERVED IN CHICAGO.

THE 200th anniversary of the birth of Benjamin Franklin, philosopher, scientist and statesman, will be more fittingly and elaborately observed in Chicago than in any other city in the United States—not excepting Boston or Philadelphia, the former his birth-place and the latter the home of his achievements. Franklin was born January 17, 1706. By a coincidence, the electrical show, which promises to be the greatest of the kind ever held in the world, will be on at the Coliseum. President Insull and the directors of the exposition plan to make Wednesday, January 17, "Franklin Day," and special appropriate features will be arranged for the occasion. Franklin's scientific investigations of 150 years ago were the foundation for the wonders of today in electricity, consequently nothing could be more appropriate than a great modern electrical exposition for the observance of his birthday. The Philosophical Society of Philadelphia of which Franklin was one of the founders and which is still extant, will be invited to participate and the technical schools or departments of the colleges in the West will probably be asked to take part in the program. It has been suggested that the representatives of the trades hold a banquet on the evening of Franklin Day at which everything served will have been cooked by electricity.

Director E. B. Overshiner of the exposition is in communication with Senator Hopkins with the hope that the latter will get the government to establish a wireless telegraph station at the show which will be under the direction of Rear Admiral Manney, of the Bureau of Equipment, and from which the government tests will be continued. It is the desire of the directors to make long distance records by the wireless, both for direct and relay messages.

More than half the floor space of the Coliseum is already sold and there is every reason to believe that the entire available 3,800 square feet for exhibition purposes will be gone long before January.

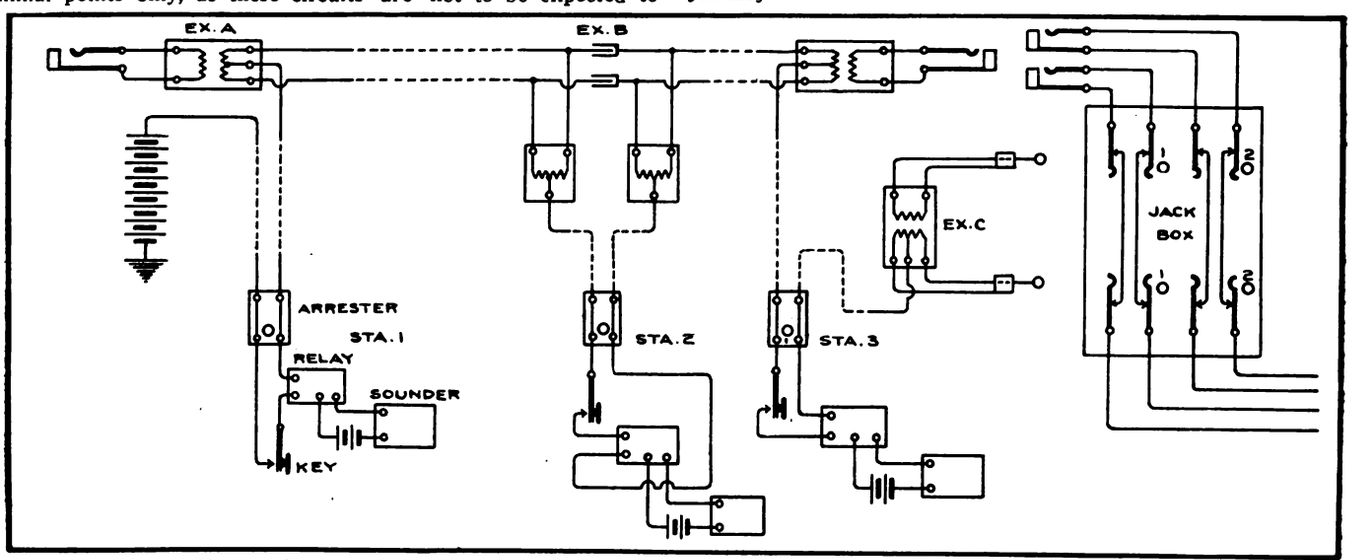

Fig. 8a. Specimen simplex line, with repeating coils. Jack boxes for through connections. Continued on Fig. 8b.

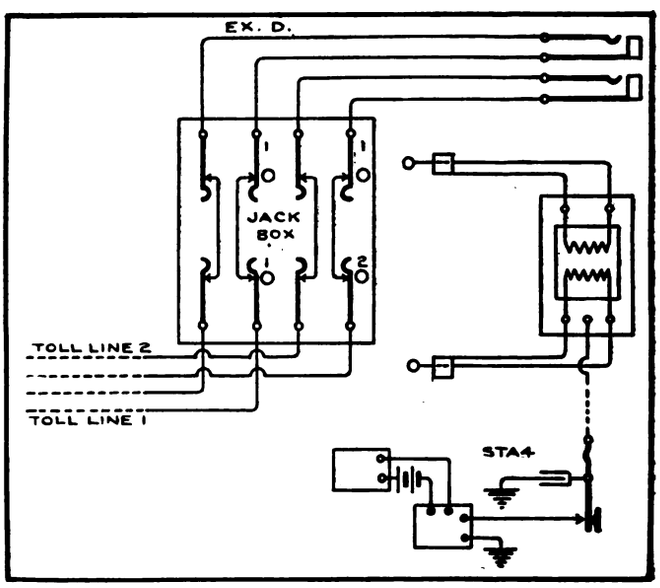

Fig. 8b. Continuation of Fig. 8a.

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Underground Conduit Construction

By W. R. Harris.

THE term "underground conduit" is used to designate a structure built under the surface of streets or pavements for the purpose of containing electrical conductors in the form of insulated, lead covered cables. This structure is generally a system of tubes, laid in layers or tiers. The walls of the tubes are composed of vitrified clay, bituminized fibre, concrete, wood or iron. This is the safest and best method of installing electric cables, and is the cheapest to maintain. All electrical conductors, telephone, telegraph, electric light, electric power or trolley feeders should be placed underground for reasons of public safety and convenience, provided the placing of such wires underground will not work an undue hardship upon the public service company which owns them. Any overhead wire is a source of danger to the public, for serious injury may be inflicted upon a person tripping over a dangling wire, or if the wire is charged with a high tension current death may be, and often is, the result of accidental contact.

Breakage of overhead conductors may be guarded against, but never entirely prevented. Although poor construction, the use of cheap materials, and natural wear and tear may be the cause of deadly accidents, quite often heavy wind storms will blow down and sleet storms break overhead lines, causing accidents that cannot be charged to negligence.

During the winter of 1901-1902 sleet storms did great damage all over the country, and in several Kentucky towns entire pole lines were broken down by the weight of sleet. Where the poles stood the strain the wires themselves failed, and for a period of over a week telephone service was demoralized. On one pole route every line was in trouble, a number of wires ruptured, the remainder being grounded or crossed. Several wires had sagged down until they were in contact with a 1,100 volt alternating circuit, and were charged with the dangerous current. A man and a child about a quarter of a mile apart on the same street came in contact with broken wires and were badly injured by the alternating current at almost the same instant. Fortunately neither received the full force of the current. In another case a half dozen poles broke short off, one pole with its load of wire and sleet falling on a frame cottage, and badly wrecking it, the occupants of the house narrowly escaping serious injury.

Both of these accidents were due to causes beyond the control of the operating company, and yet were expensive, as the injured persons and owners of damaged property presented claims for damages. The repairing of broken down lines, setting of new poles, etc., was in itself a large item of expense, for every available man was engaged in clearing up trouble for nearly a week. Many of these damaged routes were covered by a sufficient number of conductors to be placed underground without working an excessive hardship upon the owner.

A peculiar accident occurred the latter part of November, 1904, in St. Louis. Some linemen were pulling up slack in heavy trolley feeders when the pole on which they were working collapsed. The weight of the released wire then broke several poles in succession. The following is an editorial comment from the St. Louis *Post-Dispatch*:

"The collapse of a trolley wire pole loaded with 24 heavy power cables spread wreckage for 300 feet along Chouteau and Tiffany avenue and filled the street with live wires. Two men were injured and traffic was interrupted on the Missouri Pacific and Frisco, as well as along the adjacent streets. Good fortune prevented loss of life, this time; but overhead wires are a perpetual menace. Heavily charged power wires on overloaded poles are likely to cause trouble at any time. Safety lies in putting the wires underground. This is the only method of carrying electricity not attended with momentary peril. In the downtown district this improvement has been made. It should be extended to every wire strung on poles within the city limits."

Telephones are a public necessity, and it is not practicable to place all wires underground at the present day. All public service corporations should be allowed to transact business at a reasonable profit, and should all wires be put underground either the companies would have to operate at a loss or would be forced to charge such rates as would prohibit the wide extension of telephone service.

Many telephone companies place their wires underground long before legislative action is taken to compel them to do so, from motives of economy in operation. It is obviously impracticable to erect and maintain, for instance, as large a number as 400 bare wires or more on one pole line. There is a limit even to the number of aerial cables (of say 100 pairs each) that can be placed on a pole line.

An item which tends to increase the economy in conduit systems is the low cost of maintaining not only the system of ducts but of the cables, as repairs are seldom necessary. Underground cables are beyond the reach of storms, fire, lightning, high tension crosses, vandals and the small boy's ever-ready rifle, all of which are sources of frequent injury to aerial cables. Pole line construction is but temporary at best, while an underground conduit properly laid is practically imperishable, as shown by the recent disastrous Baltimore fire, which did not destroy a single underground cable. The only damage done was to that part of the cable above ground at terminal poles or in cellars of buildings. Another feature of overhead construction detrimental to the safety of public life and property is that the wires interfere with the prompt raising of ladders and otherwise impede firemen in their work.

The principal reasons for not placing wires overhead and the results attained by placing them underground may be summarized as follows: (1) Public safety to life and property. (2) Economy in construction when applied to heavy loads. (3) Economy in operation and maintenance. (4) Improved appearance of streets, for poles and wires are unsightly as well as dangerous.

The questions that should be considered by either a new or old company are: (1) Should we go underground for any one of the above reasons? (2) Will our routes be sufficiently large to justify underground construction? (3) Considering local conditions (trees, other pole lines, such as electric light and power, prevalence of high winds, storms, sleet storms, etc.), is it best from an economical standpoint that we place our wires underground? (4) What routes shall we make underground and what shall we make aerial?

Having decided that a part of the system should be underground, the next question is to determine what part shall be so constructed. To determine the size and location of the proposed conduits a careful and accurate survey of the probable or proposed underground district should be made. The results of this survey should be tabulated and placed on a plan of the district. The data to be ascertained are as follows:

(1) Number and location of subscribers, both present and prospective. (2) Width of streets and pavements. (3) Lengths of blocks. (4) Location of other underground structures, such as sewers, conduits, catch basins, gas, water and steam heating mains, pneumatic tubes, fire cisterns, fire plugs, with the size of each, its depth from the street surface and distance from either the nearest curb or property line. (5) Probable direction of future growth of town. This latter item is quite often controlled to a certain extent by physical conditions such as prevail in the case of a town situated on the bank of a large river. There may be other conditions that would tend to direct the growth of a town, and all should be given the most careful consideration.

All these points have a vital bearing on the design of a conduit system that is intended to be permanent. The writer knows of one instance where through a short sighted policy one trench was opened three times for the laying of ducts, and does not doubt but what the same trench will be opened again in a few years for

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additional ducts. The reasons for laying all the ducts that will be needed within a reasonable time are numerous and important.

Such a survey as outlined above, carefully made and recorded, will assist materially in the designing an underground system to be constructed at a minimum cost. Economy should be attained, not by cutting down the number of ducts necessary, but in cutting out superfluous labor and materials, and by overcoming difficult problems and avoiding obstructions in the most practical way. On all work of magnitude an engineer experienced in conduit construction should be consulted.

STATE OF TENNESSEE CANNOT IMPOSE POLE TAX.

THE city of Memphis, Tenn., in 1902, filed a bill of complaint in a chancery court against the Postal Telegraph and Cable Company, seeking to recover a judgment for $17.72 on account of rents alleged to be due for the occupancy of the streets of the city by the defendant's telegraph poles or, in case such a decree would not be proper, that the rights of the company in the streets of the city be declared forfeited and its occupancy thereof terminated. To this bill of complaint the company demurred on three principal grounds. First, that the city had no authority to collect rental of the defendant; second, that the charge sought to be collected as a rental is a tax, and therefore unconstitutional; third, that the rental accruing between September 20, 1894, and June 4, 1896, was barred by the statute of limitations. The court sustained the demurrer of the company and dismissed the city's bill of complaint. In so doing the court held that the streets and alleys of the city are public property over which the State of Tennessee, as a sovereign, has the right of absolute control, and with respect to which the city, which is the creature of the Legislature, can exercise only such powers as have been granted by the Legislature, which are limited generally by its charter to the enactment of ordinances not in conflict with the general laws. The Legislature having granted to telegraph companies the right to construct and operate their lines upon the public highways and streets of the municipalities of the State, in consideration of the immediate dispatch of official messages as therein required, the city has no power under its charter to require the company to pay a tax or rental on its poles for the use of such streets and the ordinance imposing such tax is void.

POSITIONS OF ELECTRIC LIGHT AND TELEPHONE WIRES RUN ON SAME POLES.

WE have recently received from Mr. V. D. Greene, of the telephone department of the Illinois Tunnel Company, a letter in which he expresses his disagreement with the statement that in cases where the same poles are used to carry both electric light and telephone wires, the telephone wires should be placed nearer the tops of the poles. Owing to the intrinsic value of Mr. Greene's opinion, and with the hope that it will lead to further discussion and bring out experiences of men in different parts of the country, we print his letter, as follows:

"I note that in your issue of November 4th last, page 314, in discussing the joint use of pole lines by electric light and telephone wires, you say 'the telephone wires should be on top, basing this conclusion upon the fact that this is the less dangerous arrangement.'

"My experience and observations compel me to disagree with this statement, and to believe that the arrangement that you suggest should be reversed, and the heavy current wires placed above the telephone wires. I do not like such combinations, but sometimes it is necessary to make them, and when they are made every care should be taken to protect not only the men who work on these lines, but the public as well. A distance of at least four feet should be allowed between the two systems, six feet if possible in order that a lineman may be able to work on either set of wires without getting into contact with the other.

"Electric light wires are seldom disturbed after construction, while telephone wires are being constantly rerun or changed. This necessitates the telephone linemen going through heavy current wires of which they know very little, every time they go up a pole, if the arrangement you suggest is made. It also means that every new telephone wire must be strung through electric light leads, which is very dangerous work, while there is comparatively no danger in stringing an electric light wire through telephone leads. Electric light wires do not break as often as telephone wires, and a telephone wire dropping through a high tension lead is almost certain to get into contact with some of the electric light wires and become dangerous to passers by.

"The above are my reasons for opposing the arrangement you recommend, and I should be glad to learn of any advantages derived from placing the telephone wires on top of combination poles."

JUSTIFIABLE WIRE CUTTING IN INDIANA.

IN the celebrated Brune case where party line subscribers adopted extreme measures to be rid of an objectionable patron, the court holds their act to be justifiable. William Reiman, who was tried in the Vanderburg Circuit Court at Evansville for maliciously cutting the telephone wires to his neighbor's house because, as was alleged, the neighbor's boy used vulgar language over the telephone, was found not guilty by the jury.

Last spring Reiman and seven other subscribers to a party line decided that Frank Brune was an objectionable member of the company and cast about for means to get him off the line. The telephone line was a mutual affair, each patron buying his poles and wires and putting up the line across his own land. Brune was on the extreme end of the line next to Reiman. A secret meeting of all the patrons except Brune was held, and it was decided to sever connections with Brune's house and then dissolve the old company and reorganize and incorporate, leaving Brune out. Reiman volunteered to do the wire cutting. He severed the wire at the point where Brune's farm joined his, and then took up all the telephone posts leading from his house to Brune's farm. Brune had Reiman arrested, charged with malicious trespass. The case was tried in a justice's court and Reiman found guilty. Reiman appealed, and the trial court is reversed and the manner in which an objectionable patron may be gotten off a telephone line is fully demonstrated, unless the Supreme Court rules otherwise.

TRANSMISSION OF MUSICAL TONES BY TELEGRAPH.

WE have recently received from a correspondent a letter which may recall some of the experiments made in the early days of the telephone, when the necessity for an absolutely unbroken transmitting circuit was not appreciated. It will be recalled that it was found to be comparatively easy to transmit musical tones, and we believe that the phenomenon herewith described occurs occasionally in telegraph offices under favorable conditions, and that accidental reproduction of speech by telegraph instruments on composite circuits is not unknown. We shall be glad to hear of such accidental cases, and print an account of a particular instance, as follows:

"Several days ago I was sending music from a phonograph out over a telephone line by means of having a transmitter fastened to the mouth of a large megaphone; this in turn was hung over the horn of the phonograph. I sent the music to several stations very well. I then thought of sending it out on our telegraph line in some way, and upon experimenting found we could do it very nicely by cutting out the line relays and adjusting the sounders very closely, so it practically acted as a receiver, the apparatus at the phonograph having first been switched over to the telegraph line. By this method of working we could furnish very clear music to all the telegraph stations. I arranged a signal with them, so that when I rung out on the line with the telephone generator, which would work the relays, they were to cut relays out and put in sounders and adjust them down. I then put in a D. P. D. T. knife switch over the telephone, having the telephone on the center, telephone and telegraph lines on the respective ends, so I could thereby supply music to either line any time—the sounder would reproduce voices very clearly as well as music."

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QUERIES

CONNECTIONS FOR SECONDARY LAMPS.—(625.)

In our new switchboard there are two sets of lamps for toll lines. One lamp for each line is located below the answering jack, and the other is located at a special position. There is a key for each line, below the lamp associated with the jack. At night each key is operated and signals for all the lines come in at the special position and are answered in the multiple. As battery is supplied to all the lamps at a position by one common wire I don't see why a single key could not be used in this common wire instead of one for each line. If this would cause any trouble will you please explain? B. F.

We understand that you refer to an arrangement in use on certain standard Bell toll boards. The plan which you mention was put in practice, we believe, at one time and until the board was cut into service no difficulty was anticipated. It was found, however, that as soon as a single call was received all the lamps were lighted. The cause of the difficulty will be apparent from an examination of Figs. 625 *a, b.* In Fig. 625*a* A, B, C represent the regular line lamps and A^1, B^1, C^1 the secondary line lamps, located at the night receiving position. Each set of lamps is connected to the negative side of the battery by a lead common to all lamps in one panel of the switchboard. When the line relay is energized the circuit is completed from the positive or grounded side of the battery through the armature of the relay and its contact, and the lamp to the negative side of the battery, and the lamp lights. In a similar manner, each lamp lights when the relay on its own circuit is operated. The operation of the key simply causes the circuit to be completed through the lamp at the night position, without changing the nature of the circuit. This is the standard arrangement, as installed at the present time.

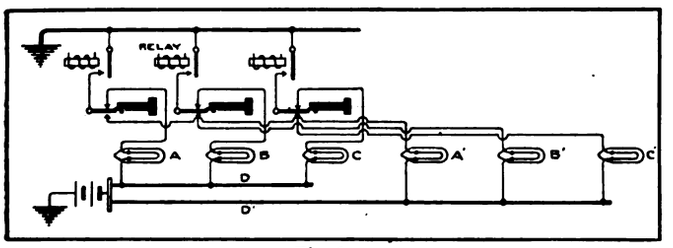

Fig. 625a.

In Fig. 625*b* is shown the arrangement of the circuit with a single key for transferring 2 common leads, and with the positive side of each secondary lamp tapped off in multiple with the positive side of the regular lamp. Assume that a call comes in, operating the line relay, and grounding one side of the lamps *A* and A^1. It will then be seen that the course of current is not confined to the single path through the lamp *A* to negative battery. With the transfer key in the position as shown in the diagram, and battery flowing through its contacts to the common wire *D*, the circuit would be as follows: One branch through lamp *A* to common wire *D*, thence to negative battery; a second more complicated branch of the circuit is that through wire *a*, lamp A^1, common wire D^1, then through lamps B^1, C^1 and all other lamps fed from battery lead D^1, wires *b*, *c*, and corresponding wires associated with other lamps, then through lamps *B*, *C*, etc., to common wire *D* and negative battery. The result is seen to be that current flows through every lamp connected to either of the common wires in question, and this holds true with regard to either position of the transfer key. The effect of this is to cause all the lamps to glow upon the receipt of a single call.

BUZZER ON TELEPHONE LINE.—(626.)

Will you please give a circuit showing how a 250-ohm buzzer may be used on a 24-volt common battery line. I have found that as soon as the negative side of the line is connected to ground by the push button that the line relay is closed as well as making the buzzer work. Another thing which I wish to avoid is the noise in the receiver, as sometimes the buzzers are used to call people into the office, and should anyone be using the extension set he would be annoyed by the noise. G. S.

We are unable to learn of any plan for accomplishing the result which you desire. In the offices of telephone companies where a buzzer is used for the purposes you describe it is customary to use a separate pair of wires, taking battery for the operation of the buzzer from the central office through a suitable resistance, using a local battery of dry cells, or using an alternating current buzzer in connection with leads from the ringing generator.

LINE CUTS OUT.—(627.)

We have a magneto switchboard, and on one line we frequently find that it is difficult to ring and hear the party, while at other times the line works all right. What is the matter? L. G.

Your difficulty may be due to either one of two causes. The line may have a fault which causes it to come open at times, or a temporary loop cross may occur when conditions are right for its production.

To determine to which class the trouble belongs, at the time of its next occurrence ring on the line with a hand generator. If the crank turns easily, the trouble is a poor contact which nearly opens the line. On the other hand, if the crank turns hard the difficulty is due to a swinging, or temporary loop cross. In the former case, if you have an iron wire line the trouble may be in a bad joint; it also may lie in a loose connection which is made and broken at intervals by a jar. This might be found either at the sub-station in almost any part of its wiring, or at the central office. If at the latter place it is more likely to be in a jack than anywhere else. Its exact location can be determined by testing. The first test should be from the protectors,

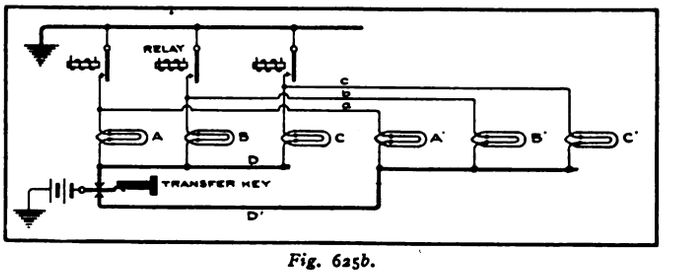

Fig. 625b.

with the line opened, and its results will determine whether the trouble is in the central office or outside. Subsequent tests can then be made, and its exact location and nature discovered.

TROUBLE IN INTER-COMMUNICATING SYSTEM.—(628)

We have in our factory an inter-communicating system installed by a Bell company. One of the stations talks all right, and we can ring any other station from it. However, if in trying to ring this station from part of the stations one presses the button before taking the telephone off the hook, the bell will not ring. From others it rings all right, even though the telephone at the calling station is on the hook. It is annoying to have to remember at which stations to take the telephone off the hook, and as the local force is unable to find any trouble we should be glad to have you help us. A. M.

The trouble is probably due to a reversal in the line. As calling is done over one side of the line on these systems, it follows that in case of a reversal, ringing current can only get to the calling side of the line after the telephone is on the hook, passing through the transmitter and receiver. To locate the reversal, note the stations from which you can ring with the telephone on the hook, which join the main cable furthest from the station in trouble. The reversal will be found at this junction, or the one next farthest from the station in trouble.

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THE EDITOR'S PAGE

TELEPHONE ACCOUNTING AND FILING SYSTEMS.

THE unparalleled growth of the Independent telephone business has in nearly all cases so far surpassed in its rapidity the progress anticipated, that some of its branches have never received the attention necessary for their proper development. As instances of rapid growth mention might be made of the Independent plants in Toledo, Ohio, and Swedesboro, N. J. In the first case, when the Independent company applied for a franchise the Bell company had 1,700 subscribers in Toledo. Pressure was brought to bear in such a manner that the franchise granted to the Independent company contained a clause prohibiting the operation of an exchange until 2,000 subscribers should be connected to its system. Although the Bell company was jubilant that its opponent had a worthless franchise, the Home people were confident of their ability to handle the situation. As a matter of fact, by the time the plant was ready the number of subscribers awaiting connection was twice as great as the number connected to the Bell system. In the few years since that time the company has made an immense growth, the present number of subscribers being over 9,800. The People's Rural Telephone Company, of Swedesboro, N. J., began in December, 1904, with 75 subscribers. It now has about 650, and is growing at a very rapid rate.

One result of this remarkable development has been that the managers of the different enterprises have been forced to devote all their energies to providing means for handling the ever-increasing numbers of messages. New subscribers have been constantly demanding connections to each system. The details of work most directly connected with giving service to the public have been so urgent in their demands for time that little consideration has been given to internal affairs.

One of the principal branches which has suffered from this unbalanced development is the system of accounting and bookkeeping. Referring to the examples cited, it can readily be understood that bookkeeping systems planned for plants not to exceed 3,000 and 75 subscribers respectively, are hopelessly inadequate when in one instance the number has rapidly increased to nearly 10,000 and in the other to nearly 700 subscribers.

THE AMERICAN TELEPHONE JOURNAL believes that many companies have made a serious mistake in so overlooking this department. It believes that this neglect has caused many companies the loss of hundreds and thousands of dollars in the past, and that until proper attention is given to this detail, more money will be lost every day. The books of the average company furnish merely a record of expenditures and receipts. A modern system of bookkeeping is more than a record. It makes possible the rapid and inexpensive gathering and classifying of all information needed by the management. It furnishes accurate statements of the earnings and expenses of each and every exchange and station throughout a system. With it the handling of complaints and the discovery of errors is expedited. Every bit of information is tabulated in a certain place and manner. To obtain a given piece of information it is not necessary to make a long search and sometimes a fruitless one, through volumes and files of like records, not properly indexed.

Many companies have records of the amount of time and cost of time and material spend for every purpose. Although little practical information can be obtained from these records in their present form, it is true that from records properly designed for the purpose all figures desired by the management could be obtained by a clerk at headquarters.

In addition to the features which provide accurate information of costs and profits, the system of a telephone company should be such as to enable complaints to be handled readily and effectively; the collection department to be operated at small cost, and the work of the auditing department to be handled with the least possible outlay, making it possible for this department to check all expenses completely and accurately.

A poor system of bookkeeping is a serious hindrance to the progress of any company. It acts as a continuous drag owing to its inability to uncover and assist in the detection of weak points which if remedied would result in a lowering of expenses and an increase in earning capacity. It also interferes with the development of the service through co-operation with other companies in adjacent territory, owing not only to the faults of the system used by each, but to the diversity of these systems. In case of combinations of companies it becomes necessary to reorganize their systems with consequent heavy expense.

A most important feature is that it is impossible for a prospective investor to obtain satisfactory evidence of the value or attractiveness of the property without extensive investigation. This the small but careful investor is unwilling as well as unable to make because of the expense, it being necessary to employ an expert. A correct system of bookkeeping would enable the financial condition of the plant for any period to be quickly learned.

Independent companies being so closely allied in their interests should without doubt employ so far as possible a standard method of accounting and filing. Diversity of methods has an injurious effect from the investment standpoint. An investor familiar with the system of one company, when he attempts to extend his investments finds that he again must go through with an examination of books arranged on a system with which he is not familiar. He is liable to become discouraged and take his money elsewhere.

This matter of handling records and accounts is of such importance that it requires the most careful consideration of all companies. It is one of the most vital points affecting their prosperity. Any change which is necessary will become more and more difficulty in the future. All telephone companies which feel the necessity should make a radical change at the earliest moment possible, in order to avoid a continuance of constant losses and also reduce the expense involved in making the inevitable change. In order to assist in the development of this most important department we shall, beginning in an early issue, publish a series of articles by an expert telephone accountant who is thoroughly competent to handle the subject. The author of these articles has acquired a most desirable reputation in telephone accounting and systematizing and is well-known in the telephone field. He is constantly engaged in this class of work, and is in direct touch with the requirements of the telephone business. The articles will be an extended series, and will cover a most complete range of essential subjects, including not only matters relating to fianancial statements and statistics, but the handling and filing of toll tickets, traffic records, correspondence, etc. The system outlined will be of such a nature that it can be applied to small companies as well as to the largest system, and will be capable of expansion with the growth of the company to deal satisfactorily with any amount of business. While complete, such a system is not cumbersome, nor costly, as its fundamental idea is based upon correct classification of the information which it should carry. A system like this not only gives better records, but it makes it easier to keep them. It brings about a reduction in cost, not only indirectly, through its ability to give complete and accurate information, but directly, through the reduction which is made possible in the amount of time consumed by clerks in keeping records, and in searching them for information.

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THE TELEPHONE IN THE COURTS

CONDUCTED BY A. H. McMILLAN.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

DANGER OF FALLING WIRES.

I have been told that in one of the Western cities (Cincinnati, O., I think) an arc light wire became crossed with a police signal wire at night about nine years ago, injuring thirteen patrolmen, two of whom died from the effects of the shock. Could you get me the facts as to whether the city mentioned above is correct, also if the number of injured men is right, and if any of them died, and if possible what it cost the city to pay for damages. We have been laying underground cable for the past nine years to this city and I want to show that the expense of replacing the overhead wires by underground is justified. I want to point out the danger of falling wires over high potential circuits and if possible show that the expenditure in the past was not only necessary and desirable, but it was for the city's interest. B.

THE facts you mention evidently did not result in any law suit that was carried to a higher court, as the legal editor cannot find any account of the case among the reported decisions. We agree with your contention that the expense of replacing overhead wires by underground wires is justifiable and hope you will suceed in convincing the public of that fact.

TELEPHONE MAY BE PUT IN BY A TENANT UNDER AN IMPLIED AGREEMENT.

Can a landlord prevent his tenant from installing a telephone in his apartments? If a tenant installs a telephone without the landlord's knowledge, has the landlord the legal right to cut the wires or prevent his tenant in any other way from using the telephone without process of law? L. F.

WE are not acquainted with any case in which this question has been brought before the courts for solution. On general principles, however, we are of the opinion that the courts, if the lease were silent upon the subject, would allow the tenant to have a telephone against the protest of the landlord. The installation of a telephone instrument is such a use of the premises as would be contemplated by the lease, no matter what the premises are to be used for, since the telephone has become almost an article of necessity in every home as well as business establishment.

PERMANENT INJUNCTION DENIED AT DETROIT.

JUDGE SWAN, in the United States Court at Detroit, Mich., has declined to grant the order for a permanent injunction asked for by Attorney Charles A. Thatcher against the Co-operative Telephone Company and its officers to prevent the sale of the Co-operative company's plant and franchise to a group of capitalists from St. Louis represented by Max Koehler and S. B. Jeffries. Attorney Thatcher argued that the officers of the Co-operative company had agreed to sell the plant and franchise to a group of capitalists connected with the Commonwealth Trust Company of St. Louis, whom he represented. Judge Swan's decision leaves the Co-operative company free to proceed with the sale of the plant to Messrs. Koehler and Jeffries and their group of capitalists, who have already organized a preliminary corporation to take over the plant and do the preliminary work connected with the development of the Co-operative company into a large Independent exchange connected with the State Independent lines and the Independent lines to New York and St. Louis.

CITY CANNOT INTERFERE WITH COMPANY CHARTERED BY STATE.

IN the case of the City of Vancouver v. the British Columbia Telephone Company, the former seeking to prevent the latter from performing certain work at the present time. Another question was also involved, that of the conflict of the charters of the city and the company. Upon the decision of this point rested the whole field of operations of the company in the future. Mr. Justice Morrison goes fully into the case in his opinion. He begins by stating that in April, 1905, the defendant company notified the city of its intention to lay underground wires, and conferences were held, with the result that the engineers of the respective parties went over the route and located the manholes, etc. This plan was approved by the city's engineer and duly signed. At that time the engineer had not heard of the city's objections, but afterward, when he heard of it, he refused to sign a letter presented to him. This showed that the company had outlined its plans to the city. The claim of the plaintiffs that the charter of the New Westminster and Burrard Inlet Telephone Company has expired, is one which Mr. Justice Morrison declares he cannot agree with. The conflicting clauses of the city and telephone company's charters are given in full and the opinion states that the contention of the city, that the company's claimed rights are lost by reason of the conflict, is one which will not hold.

The opinion states, "The streets were vested in the city for certain general purposes, such as securing to the public thoroughfares through the city, and powers were given by the Legislature to the company in respect to those streets for certain other purposes. I can find no provision of the Legislature which empowers the city to prohibit the defendant company from exercising its statutory powers, nor is there any authority enabling the defendant to exercise certain of those powers without the approval of the city. The city cannot prohibit the company from exercising its powers by the refusal to approve. Even if dispute should arise, by application of well-known canons of construction, I am bound to hold, in this instance, that the rights of the defendant prevail." The opinion also states that the city has suffered no damage by the acts of the company.

APPROXIMATE CAUSE OF ACCIDENT.

ACTION was brought against the Muskegon Traction and Lighting Company, of Muskegon, Mich., by William Stark, Jr., for damages on account of personal injuries. The company's insulated wires carrying a heavy current of electricty were supported by two arms extending over a pole, and two feet below the arms were telephone wires supported by insulators attached to the pole. One of the telephone wires was broken and as plaintiff, a boy ten years of age, was holding one end, the other end was made a plaything and was thrown against defendant's wires by a playmate, striking a place on defendant's wires where the insulation was defective, sending the current through the broken telephone wire and injuring the small boy. The boy knew that others while playing with the wire had received slight shocks. The Supreme Court of Michigan held that neither the failure of the defendant to place its wires at the height required by a city ordinance nor the defective insulation was the approximate or real cause of the accident and that a condition of things was shown to exist which was safe and harmless unless unwarrantably interfered with. It was therefore held that a verdict was properly directed for the defendant company. Stark v. Muskegon Traction & Lighting Co., 12 D. L. N. 550.

MUST COMPANY PAY LICENSE FOR SLOT MACHINES?

THE legality of the Bell Telephone Company installing slot machines at Montreal, Canada, without payment of a license fee to the city is to be tested in the courts. A summons has been issued from the Recorder's Court asking the company to show why the civic by-law adopted some months ago, levying a tax of $5 on these machines, had not been complied with.

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IN THE OPERATING FIELD

COLUMBUS, O., TO HAVE INDEPENDENT LONG DISTANCE SWITCHBOARD.

GENERAL MANAGER G. R. JOHNSTON, of the Columbus Citizens' Telephone Company, is highly elated at the near completion of the immense long distance switchboard which is being installed. The new board will be completed about December 1, and its installation will be a great relief to the business which is crowding the company. It is said to be the largest switchboard for long distance business installed in any Independent plant in the country. It will have 32 operators' positions, and will start in with 60 long distance lines, 22 Franklin county exchange connections and 60 rural and suburban connections.

The company is also installing automatic telephones at the rate of fifteen a day, and would put in one hundred a day if it could obtain the necessary facilities and men. It is said that the scarcity of these ever since the new automatic system has been installed, has been a serious handicap to the extension of the system, so great have been the demands for the company's service.

NEW YORK ELECTRICAL SHOW TO HAVE MANY INTERESTING FEATURES.

THE electrical show to be held at Madison Square Garden for two weeks, beginning December 12th, will be formally opened by President Roosevelt who, by the pressure of a button in the White House, will set in motion the machinery of what will doubtless be the most successful exhibition of the uses of electricity ever given in New York.

This exhibition, in addition to modern electrical machinery for securing maximum power from minimum expenditure in industrial work, will include practically all of the latest electrical devices of a popular nature from electric heating, lighting and cooking apparatus to motion pictures and talking machines. A characteristic feature of the show will be an attempt to increase its suggestiveness and practical value by introducing into every exhibit some element of motion, either by putting into motion the apparatus shown or by arranging some suitable moving illustration of its merits. A complete electric kitchen, where will be cooked the food served in the cafe, will be one of the popular features of the show. Many of the features will be especially interesting to telephone men, as a most complete line of telephone apparatus will be exhibited.

FURTHER PROGRESS IN THE INDEPENDENT MOVEMENT IN MICHIGAN.

A RECENT sale of the Independent telephone plant at Northville, Mich., to J. B. Ware of Detroit and H. R. McPherson of Howell, is regarded as another very important step in the building up of the Independent system which will cover the State. As Mr. Ware is the president of the Independent Telephone Association of Michigan, the significance of the movement is apparent. The Northville exchange possesses considerable importance on account of its location, as a number of important toll lines which are now under Independent control will pass through the exchange. Work on the toll lines throughout the county is progressing rapidly, and it is expected that additional facilities for communication will soon be provided. The system just transferred has an interesting financial history, having grown since its organization six or seven years ago as a sort of amateur experimental company, capitalized at $1,000, into a flourishing system that has just brought $8,500 in cash. Although the original amount invested by each stockholder was $150, at this sale each received the sum of $750, while two months ago a 10 per cent. dividend was paid on the stock of the company.

OKLAHOMA COMPANY IS PUTTING IN MANY NEW TELEPHONES.

THE Pioneer Telephone Company of Shawnee, Oklahoma, expects to complete the rebuilding of its system about the first of January. When this has been done all subscribers will talk from new telephones through cables and the latest type of central energy switchboard.

The switchboard is now ready for wiring, and cable men and linemen have been busy for several months putting in order the outside plant. The company has ordered over a thousand new instruments. When all these alterations have been made the people of Shawnee will receive a most efficient service from a thoroughly modern and well equipped plant.

INDEPENDENT TELEPHONE COMPANY IN TERRE HAUTE, IND., TO HAVE NEW BUILDING.

THE Citizen's Telephone Company of Terre Haute, which has recently been organized, has purchased a block for its new exchange at a cost of $4,500. The property has a frontage of 45 feet and is excellently situated in the city. Plans are being prepared for the erection of a new brick building three stories high, which will be as near fireproof as modern construction can provide. This will insure the absolute safety of the operating mechanism from fire risk. An elaborate switchboard will soon be installed, which will embrace all the features of up-to-date design, and it is estimated that the expense of erecting and fitting the building will reach as high a figure as $100,000. When this has been completed the Independent company will be in a position to furnish the highest class of service to the citizens of the city of Terre Haute and vicinity.

C. Y. M'VEY RECENTLY APPOINTED GENERAL MANAGER.

CHARLES Y. McVEY has recently assumed the duties of general manager of the Federal Telephone Company. Mr. McVey has been assistant general manager for some years, and in his new position will succeed James B. Hoge, whose time is being taken up with the duties which arise in connection with the organization of the Independent telephone movement and with his work as president of the National-Interstate Telephone Association. Mr. McVey has been assistant general manager of the Federal, to which office he was appointed by President F. S. Dickson, and his marked ability has made his rise to a position of importance in the Independent industry very rapid. In his new position he will exercise a general oversight of the work of the United States Telephone Company.

WEST VIRGINIA COMPANIES TO CONNECT WITH OHIO SYSTEMS.

DIRECT long distance communication over Independent lines from Ohio to West Virginia will be secured through an arrangement recently perfected by M. B. Overly of the United States Long Distance Company and the West Virginia Western Telephone Company.

Messages will be transferred from the lines of one company to those of the other. Connections will be made from West Virginia to Columbus by way of Athens. This is one of the most important contracts for service exchange that has recently been

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made, as it will enable service to be given by direct connection through Athens, where they have previously taken a roundabout route through Marietta and Zanesville. The line is already completed from Columbus to Athens and work upon its extension to Parkersburg, W. V., will be immediately commenced. It is expected that this will be a great convenience not only to the companies, but to the public, as it will enable calls to be handled much more rapidly over the direct lines, and will bring about a material improvement in transmission.

FURTHER DEVELOPMENT BEING PLANNED FOR INDEPENDENT PLANTS IN SOUTHERN OHIO.

BY the recent purchase of the Gallipolis Telephone Company, a syndicate composed of Toledo and Columbus men has come into control of that property, and steps will be taken at once to improve and extend the exchange. At present the Gallipolis exchange has about 500 subscribers, and is modern and up-to-date, being one of the best Independent plants in Southern Ohio. The men who have purchased the controlling interest are Cyrus Huling of Columbus, Dwight E. Sapp and Frank L. Beam of Mount Vernon, W. W. Morrison and J. E. Gardner of Toledo, and E. N. Coen of Vermillion. The new owners expect not only to improve the present system, but to give service to several surrounding towns and make a general improvement in the facilities for communication with outside points. They will build exchanges in Pomeroy and Middleport and will construct a long distance line to Athens. This will give the company good service to Columbus and will also add materially to the extent of territory reached from the system, as the Gallipolis Company will be one of those to go into the merger which will include Charleston, Point Pleasant, Guyandotte, Parkersburg, Huntington and perhaps other towns in West Virginia and Ohio.

PROGRESSIVE SMALL COMPANY IN KANSAS HAS HIGH PERCENTAGE OF TELEPHONES.

THE Arlington Telephone Company, with exchanges at Arlington and Abbyville, Kan., is erecting a new building for the home of its Arlington exchange. This building is being constructed of cement blocks and will be a first-class building and an ornament to the town. The new building is 25 x 45, one story, with a full size basement. The first floor will be used as a combined office and residence for the manager. The office equipment consists of a 200-line switchboard and Warner pole changer. In the basement will be located the work shop and store room, which will contain the lightning arresters, distributing board, batteries, etc., with a furnace for heating the building.

The Arlington exchange is a typical country exchange, being located in a town of about 700 inhabitants. It has about a hundred business and residence telephones in town and sixteen country lines running out in every direction, supplying the farmers in the district with a first-class service.

PATENT ON POLE CHANGERS OWNED BY WARNER ELECTRIC COMPANY SUSTAINED BY CIRCUIT COURT.

IN a recent decision handed down by the United States Court for the Northern District of Illinois, Judge Kohlsaat, presiding, sustains claims 1, 2, 9, 12, 15, 16, 17, 18 embodied in the reissued Letters Patent No. 12,162, issued on October 13, 1903, and granted to William F. Warner for a pole changer device.

These claims cover the design and circuit arrangement of the pole changer manufactured by the Warner Electric Company of Muncie, Ind. Their essential features include the combination in a pole changer of a vibrating arm, secured to a support, with means for automatically vibrating the arm by means of a circuit breaker and a separate battery; a ringing battery connected to contact points and a pair of exchange wires connected to other contact points, a pair of brushes, all to be so arranged and connected by means of circuit wires as to be adapted to change the continuous current at the battery into alternating current, in a manner described in the claims; an annunciator in the battery circuit; a condenser, and means for automatically connecting the condenser across the ringing circuit at the time of ringing; and means for regulating the speed of the vibrating arm. The court has further decreed that a competitor of the Warner Electric Company has infringed these letters patent, and is enjoined from further infringement, and liable under a right of the owners to recover damages and profits resulting from past infringement.

DEATH OF DR. F. A. WINNE.

ON November 12, Dr. F. A. Winne, of Brockport, N. Y., died as the result of a stroke of apoplexy. His funeral was held on the following Wednesday.

In 1896 the doctor became impressed with the belief that the people who should have the greatest facilities for speedy communication in times of danger were oppressed by the excessive rates charged by the Bell company in his vicinity. He wished to increase the number of his patients who could use the telephone to secure his services. He saw that a telephone system could be made an important aid to the carrying on of his practice. With this idea in mind he organized a small company with his patients as subscribers.

Dr. F. A. Winne.

From the time of its organization the doctor made constant efforts for the development of his own company in Brockport. His work was so successful that from its small beginning the company has grown until its subscribers were increased to the number of five hundred. The Bell company found itself able to offer only the most ineffective opposition, and has done very little business in the territory controlled by his company. His last official act was to arrange the consolidation of the system which he had built up with the plant of the Rochester Telephone Company. Not content with the aid he was giving his own neighbors and friends he soon became active in the good work of forwarding the Independent movement in other localities, and his activity became one of the chief factors in the organization and development of the Rochester Telephone Company, of Rochester, N. Y.

As a physician he was very successful, and until his death retained a large practice. Throughout all his career the doctor made constant efforts for the benefit of his friends and neighbors. His funeral was attended by many friends who represented every walk of life. The death of such a man, who had endeared himself to all with whom he came in contact by his kind deeds and lovable character, is felt by the whole community, and the loss of so true and active a worker for the cause of Independent telephony is mourned by every telephone man in Western New York.

EXTENSION OF INDEPENDENT FACILITIES IN TEXAS MAKING GOOD PROGRESS.

THE board of directors of the Independent Telephone Company of San Antonio, Tex., at a recent meeting reported that their business has grown very rapidly. On November 1 their books showed 2,491 telephones were in operation and 1,240 on the waiting list. The business has grown so rapidly that the construction work could not keep up with it, and the managers of the plant are enthusiastic over the figures.

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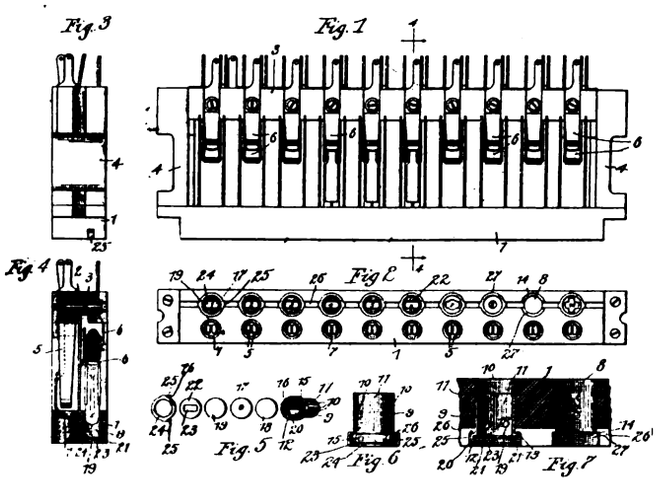
TELEPHONE PATENTS

SWITCHBOARD APPARATUS.

Thomas Vivian Davis of Kansas City, Mo., patents (No. 804,103; dated Nov. 7, 1905; filed April 4, 1904; serial No. 201,409; assignor to the Stromberg-Carlson Telephone Manufacturing Company of Rochester, N. Y.), telephone switchboard apparatus.

This invention has for its object a device for coloring or intercepting the light emanating from a visual signal. The purpose of this is to indicate to the operator the line or circuit with which the visual signal is connected. By this means the operator is informed as to whether the subscriber is connected with a grounded line, metallic line or party line. Thimbles are employed, to be inserted in openings in the switchboard in alignment with the visual signals and containing colored screens. In Fig. 1 the spring jack bank, to which the above is applied, is shown. Fig. 2 gives a front view of the bank; Fig. 3 an end view; Fig. 4 a sectional view, and Fig. 5 the disassembled parts of the invention. In Fig. 6 these parts are shown assembled, and Fig. 7 is an enlarged sectional view showing the thimble openings and manner of inserting them.



METALLIC CIRCUIT FOR SIGNALING.

Albert Koch Andriano and Herman Herbstritt of San Francisco, Cal., patent (No. 804,182; dated Nov, 7, 1905; filed March 6, 1905; serial No. 248,729) a metallic circuit for operating signaling devices.

In this invention means are supplied for selecting and operating electrically actuated devices, or other means of communication between one station and another selected station over a metallic circuit. This is accomplished by certain means for selecting any one wire for use, as a direct conductor of a circuit individual to a station, and another wire for use as the return conductor. An electrically operated device permanently connected into the direct conductor is employed to perfect this system.

LOCK FOR TELEPHONE SWITCH SHAFTS.

John Erickson of Chicago, Ill., patents (No. 801,308; dated Oct. 10, 1905; filed Dec. 31, 1904; serial No. 239,132, assignor to Automatic Electric Co. of Chicago, Ill.) a lock for automatic telephone switch shafts.

This invention relates to automatic telephone systems which have means of transmitting fire alarm signals. The object of this invention is to prevent a call being repeated, if for fire, until recorded by the switchboard attendant. It represents a specially constructed "selector switch" with a lock or catch device, set by the subscriber calling and only releasable by the switchboard attendant.

RECEIVER CASING.

Axel R. Thollander, of Chicago, Ill., patents (No. 799,205; dated September 12, 1905; filed November 10, 1904; serial No. 232,184) a telephone receiver casing.

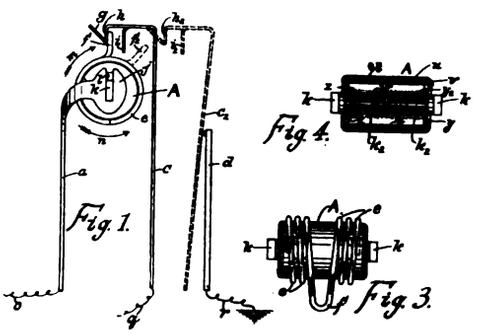
The particular feature of this casing relates to the particular manner in which the magnet and diaphragm are supported and held. The magnet is movable and adjustable, but the diaphragm is fixed with respect to the casing. Thus, the casing forms no part of the adjusting device, and the use of lock nuts is obviated.

AUTOMATIC THERMAL PROTECTOR.

Frank B. Cook, of Chicago, Ill., patents (No. 796,297; dated Aug. 1, 1905; filed Dec. 9, 1904; serial No. 236,184) an automatic restoring thermal protector.

This invention relates to thermal cut outs for electric circuits. Its use in telephone work is to protect the incoming lines from strong electric currents. Their action upon this device is such that the heat coil becomes heated to a point where lines to be protected are separated or disconnected, by means of mechanism affected by this localized high temperature.

Fig. 1 is a side elevation of the heat coil of the device, showing the protector springs as well. Fig. 4 shows a cross section of the length of the heat coil as indicated in Fig. 3. The winding w of heat coil A, Fig. 4, is wound upon a hollow spool y. This is enclosed by an insulating sleeve u and a metallic sleeve t. Spool y has a slot y^3 through which one end of the conductor w extends. Pins k^2 k^3 are inserted in the hollow spool y, and



are secured thereto by a very fusilble solder z. Each pin k^3 is provided with a flattened end portion k, which fits in a slot l in ear j of spring a to hold the heat coil from turning. A spring e is attached at f by a portion h of spring c, to rotate the coil as shown by arrow m.

A large current entering w, heats it and spool y, which conducts the heat to z, softens it and allows the heat coil to turn upon pins k^2 k^3. Spring c therefore turns heat coil A to position f^3. It then releases from the heat coil and takes the position C^3 against the ground plate d. This opens the circuit through the heat coil and grounds the line spring C. When z cools it resolders y to k^2 k^3.

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TELEPHONE PATENTS

PUSH BUTTON MECHANISM.

Burton L. Lawton, Meriden, Conn., patents (No. 804,742; dated Nov. 14, 1905; filed Dec. 5, 1904; serial No. 235,448; assignor to the Connecticut Telephone and Electric Company of Meriden) a push button switch mechanism for telephones.

In this invention the claims cover the combination with a series of push buttons of a reciprocating locking plate for locking any one or more of the buttons in its depressed position. The novel feature of the device consists in the employment of a hammer to effect the release of any button by moving the locking plate through the automatic operation of the hammer when a conversation is completed. The placing of the receiver on the hook closes a temporary circuit through the release mechanism and a separate local release battery.

MULTIPLE SWITCHBOARD.

Milo G. Kellogg, Chicago, Ill., patents (No. 804,861; dated Nov. 21, 1903; filed Feb. 13, 1892; renewed Feb. 9, 1893; serial No. 461,686; assignor to the Kellogg Switchboard and Supply Co., of Chicago) a multiple switchboard for telephone exchanges.

In this invention are set forth ways and means to arrange the circuits of a common battery switchboard. One advantage claimed is that this system eliminates the use of open and closed contact spring-jacks for the control of the line annunciators or signals.

TELEPHONE EXCHANGE SYSTEM.

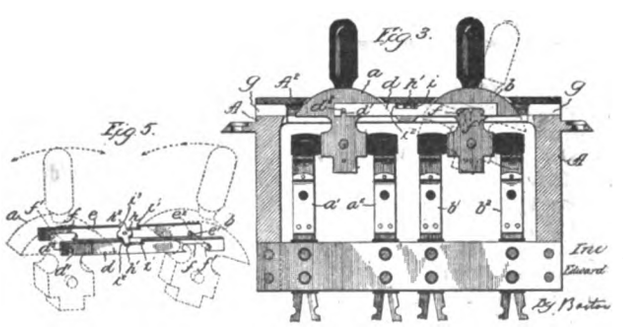
Milo G. Kellogg, Chicago, Ill., patents (No. 804,862; dated Nov. 21, 1905; filed Dec. 20, 1894; serial No. 532,483) a telephone exchange system.

This invention relates to the system known as the divided exchange, and sets forth ways and means to answer calls, make connections and secure the busy test in a system of this description.

RINGING KEY.

Edward B. Craft, Chicago, Ill., patents (No. 805,057; dated Nov. 21, 1905; filed April 8, 1905; serial No. 254,446; assignor to the Western Elec. Co., of Chicago, Ill.) a ringing key.

This invention relates to the arrangement of two ringing key



levers mounted on the same plate, one ahead of the other, whereby the manipulation of either one restores the other to its normal position.

Referring to the accompanying illustrations, Figs. 3 and 5, *a* and *b* are the rocking levers of the switches. To these are attached connecting links *d*, *e*, one on either side of the levers. Link *d* is connected to the lever *a* by the pivot d^1, but is provided with a slot *f* to allow for lost motion with relation to *b*. The link *e* is oppositely connected. It will be evident from an examination of the drawings that if one lever is pulled away from the other it will be restored to its normal position by the movement of the other lever in an opposite direction. To provide for restoration where one lever is pulled towards the other the cam *h* is utilized, which operates in openings cut in the upper surfaces of the connecting links before mentioned.

TRANSMITTER.

Jerome Prince, Milford, Mass., patents (No. 805,092; dated Nov. 21, 1905; filed Feb. 2, 1905; serial No. 243,833; assignor to Charles E. Aldrich and John H. Macdonald, of Beverly, Mass.) an electric transmitter.

The essential feature of this device is the substitution of me-

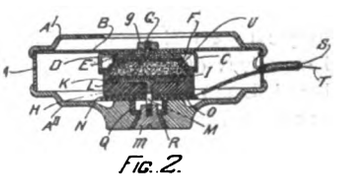


Fig. 2.

tallic instead of carbon granules for the variable resistance medium and the employment of an auxiliary flexible disc and compound formed electrodes consisting of discs of copper, zinc and carbon, in the order named. A cross-section of the transmitter is shown in the accompanying illustration. A carbon cup *H* forms the receptacle for the granular material *U*, having a back electrode formed as described. *C* is a flexible disc to which is attached the front electrode. This device is to prevent the granules falling out of the containing cup.

The inventor claims this construction to be simple, and to secure an efficient transmitter of increased power for ordinary work or for such special devices known as "ear-phones," for use of people affected with partial loss of hearing.

MULTIPLE STATION TELEPHONE SYSTEM.

Arthur J. Farmer, Detroit, Mich., patents (No. 805,126; dated Nov. 21, 1905; filed Dec. 26, 1903; serial No. 186,538) a multiple station telephone system.

The object of this invention is to provide improvements in selective party line systems. This is obtained through the use of a junction box located at and controlled by the exchange in which is placed the selective mechanism.

This consists of a series of wheels mounted on a suitable base on a common shaft, which is revolved by means of a ratchet wheel actuated by an electromagnet. On the peripheries of the wheels are pins spaced at various intervals around the circumferences, the object of which is to engage with contact springs mounted vertically upon the base.

It will be readily understood that by sending a given number of impulses over the actuating magnet circuit the wheels can be made to revolve according to the well-known step by step movement, and thus any desired line can be cut into circuit at will. The patent specifications also include modifications of switchboard circuits to permit the application of this apparatus to the calling side of switchboard cords.

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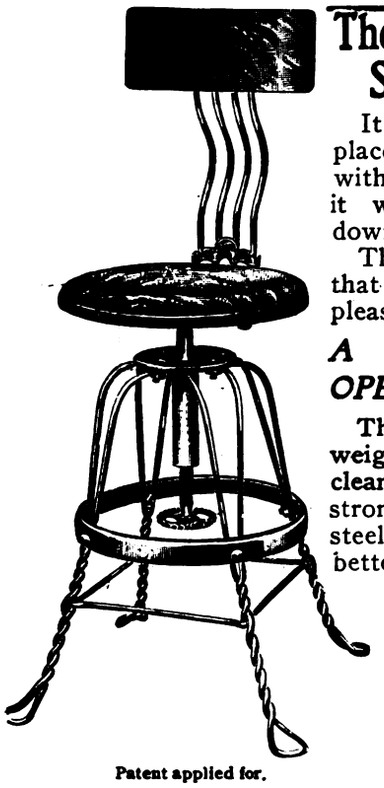

Patent applied for.

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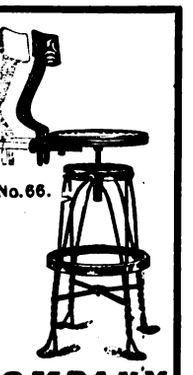

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IN THE MANUFACTURING FIELD

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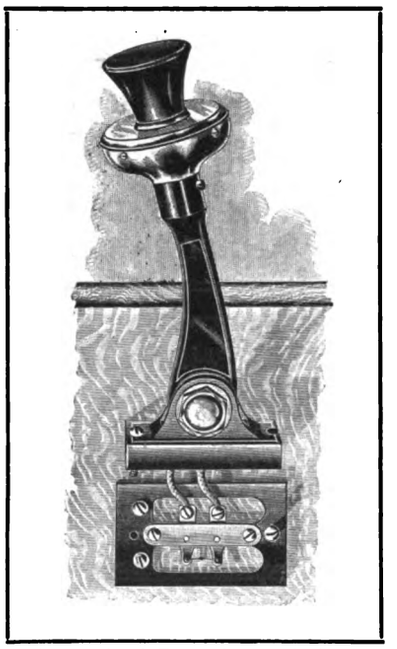
IMPROVEMENTS IN TRANSMITTERS.

WITH the present advanced development of long distance telephony, there is no other part of the equipment on which depends the efficiency of the service so much as on the transmitter. As fast as toll lines were extended and distant exchanges connected, so fast came the necessity for the highest quality in the transmitting instrument. More time and money has been expended on this part, and a greater variety evolved than all other parts of the telephone instrument and switching devices combined.

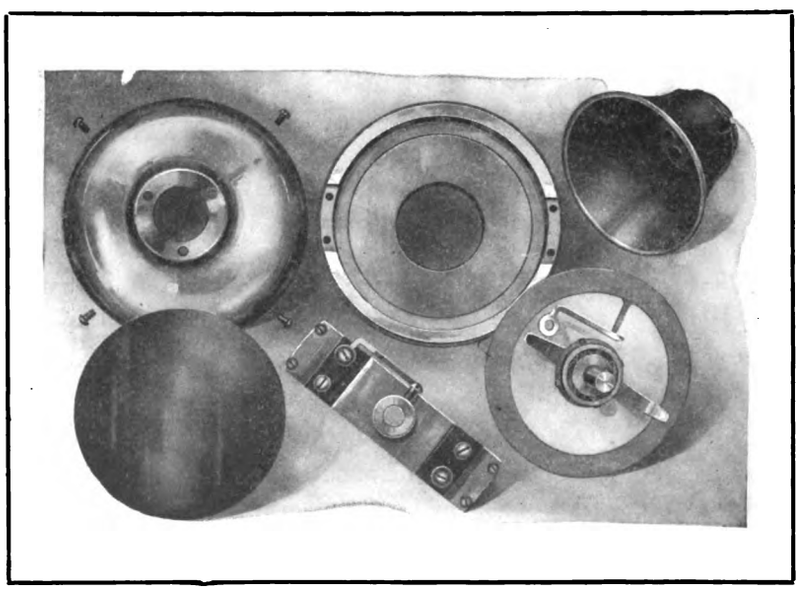
Among the large number of transmitters which have so far been produced, there is probably none for which higher claims for scientific design and durable construction are made than the one put on the market by the International Telephone Manufacturing Company of Chicago, and a brief description will be of interest.



International Transmitter and Arm.

The accompanying illustrations show the exterior of the transmitter and also the parts disassembled. The front is of heavy brass and forms a support for all the working parts. The seat for the diaphragm is accurately turned down and the sides slotted to the required depth, to form a firm seat for the bridge, and to bring it into proper relation with the diaphragm and damping springs.

The damping springs fulfill the combined purpose of damping the diaphragm, forming one electrode, and the enclosure for one side of the carbon chamber. The carbon chamber is constructed of a very light ring with an ingoing ledge at one end, to which is clamped the auxiliary mica diaphragm with a tight-fitting inner tube. The mica diaphragm, which is of the very finest quality India mica, is firmly clamped between the back electrode and adjusting post. The carbon chamber at the end, toward the main diaphragm, is provided with an outer ledge around which are clamped four legs of a binding ring, passing through the diaphragm from the front. This binding ring firmly clamps the ledge of the carbon chamber to the combined electrode and damping spring, and also presses the inner tube of the chamber solidly against the mica diaphragm, and at the same time securely holds all of the working parts directly in the center of the main diaphragm.



Working Parts of International Transmitter.

This construction makes a transmitter with all of the essential working parts self-contained and firmly riveted together, and absolutely prevents loss of proper adjustment. The chamber being supported on the diaphragm, agitates the carbon whenever the transmitter is used, keeping it alive at all times, thus preventing packing. The damping springs are formed by machine into the proper shape, so that when the diaphragm is set into the front case and the bridge is placed in position and screwed down, the back electrode set screw can be fastened and the transmitter is in the proper adjustment for long distance work. The collet for the back electrode post is insulated from the bridge by mica washers and is provided with a substantial German silver punching for a connection leading to a terminal screw on an insulated block at one end of the bridge.

An aluminum punching, forming a connecting lead for the front electrode, is riveted to the outer edge of the diaphragm and terminates at a terminal screw on a rubber block at the other end of the bridge. The diaphragm is insulated from the frame by a rubber band, thereby preventing the exposed metal parts from forming any part of the circuit, and leaving no loose connections. The bridge is formed up of heavy bar brass, ¾" by ⅛", and is swedged into proper form to make the corners square and perfectly rigid. An auxiliary protecting diaphragm of mica prevents moisture from entering and corroding the metal diaphragm and parts. The back of the transmitter is constructed so it may be provided with a lug, or arranged to fit any make of arm.

All "International" transmitters are provided with the well-known granular carbon, universally used by their manufacturers, which is made of the very hardest form of coal and properly treated with a very high degree of heat, under the direct supervision of the company. This insures that all of its product goes out with equal efficiency, and enables the company to guarantee its transmitters unreservedly, both as to efficiency and durability.

THE CONNECTICUT TELEPHONE & ELECTRIC COMPANY of Meriden, Conn., has issued new catalogues, No. 9 and No. 10, covering long distance and interior telephone equipment, respectively. These catalogues are handsomely illustrated with half-tone cuts throughout and go into careful detail for each line of equipment. Each issue contains descriptions of many new and up-to-date specialties. The Connecticut company during the last year has been obliged to largely increase its plant, and the prospects are very bright for an even larger business during 1906. The company will be pleased to mail its new catalogues, No. 9 and No. 10, to any one interested.

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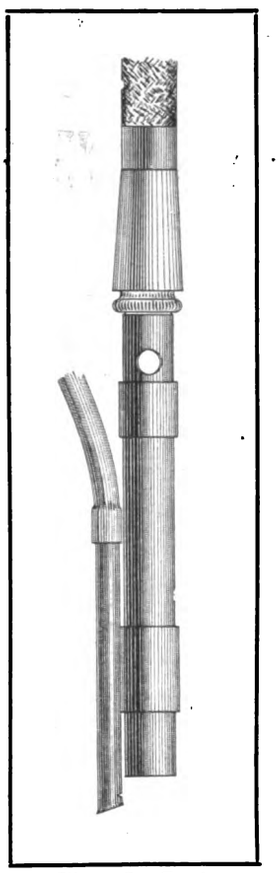
IN THE MANUFACTURING FIELD

GAS TORCH.

IT is claimed by the Climax Manufacturing Company, of 1 Hartford street, Boston, that the Climax gas torch combines the qualities of a Bunsen burner and a gas blow torch in one. Its use is to be found mainly in shops where soldering or light brazing make it a necessary and convenient accessory. The fuel used is illuminating gas, by means of which a variety of different forms of flame can be obtained, adapted to the article to be heated and soldered. The possibilities of flame adjustment procures a temperature which ranges between that of a soft, slow and somewhat diffused heat and that of a long pointed, intensely hot center of heat. By this means the torch may be employed for different classes of work, as, for instance, hard or soft soldering, or to effect junctures between heavy copper wires with dispatch. The construction is such that its durability, as claimed, is a guarantee of long years of service. The flame adjustment is readily made by the mere act of sliding the blow pipe up or down, so that the air plays upon the root of the flame or nearer the tip, as the conditions may require. By this means diffused or concentrated centers of heat are secured at will and retained as long as necessary.



Climax Gas Torch.

THE WESCO ELECTRIC SUPPLY COMPANY, SAINT LOUIS, MO., and FORT WORTH, TEX., has been issuing for some time past a monthly magazine entitled "The Live Wire." The number for November is the fourth of the fourth volume, and contains several interesting items relative to the electrical trade. A continued story, entitled "Nebrasky," treats in a humorous vein the experiences of a farmer who had profited by the use of electrical apparatus; a page is devoted to new things. In this issue an electric heater, vibratory machine, kerosene furnace and a portable testing instrument are described. Several short articles having a bearing upon electrical matters conclude the number. Classified advertisements for help or positions wanted are inserted free. In the advertising section there is a classified list of upwards of 250 different articles which the Wesco Company either manufactures or has for sale. Parties desiring to receive this magazine, which is free, and contains many items of general interest which make it well worth reading, should write the Wesco Company.

THE STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY, Rochester, N. Y., is sending out mailing cards which draw attention to its facilities for quick shipments of apparatus from its Chicago office. On one of the cards is depicted an auto truck, which is used for transfer purposes between the Chicago warehouse and the freight yards. Another card carries an illustration of the stock room for magneto apparatus. As these cards show that a large stock of instruments is always on hand, and that facilities exist for their rapid transportation they form a very practical advertisement.

The company also reports having closed contracts for switchboards for the following places: Friendly, W. Va.; Sisterville, W. Va.; New Matamoras, O.; Laclede, Mo.; Long Lake, Minn.; Eureka, Utah; Payson, Utah; Richmond, Utah; Tooele, Utah; Preston, Idaho; Lowville, N. Y.; Louisville, Ky.; Attica, Ind.; Rochester, N. Y.; Leechburg, Pa.; Whiting, Ind.; Tingley, Ia.; Herrick, Ill.; La Grange, Ky.; Streator, Ill.; Seattle, Wash.; Germantown, Neb.

THE HOLTZER-CABOT ELECTRIC COMPANY, Brookline, Mass., announces the discontinuance of its New York offices after December 1. The company believes that as the nature of its business involves such a variety of engineering problems, it will be for the best interests of its patrons to deal direct with the head offices. It feels confident that this change will bring about an increase in the rapidity of handling its business. All future communications should be addressed to the Holtzer-Cabot Electric Company, Brookline, Mass.

THE NUNGESSER ELECTRIC BATTERY COMPANY, CLEVELAND, O., is sending out a novel card which draws attention to its 1900 dry battery. On the front is a humorous illustration, and on the back are a number of Don'ts which it would be wise to heed. The Nungesser Company has had exceptional success with this type of dry cell, and feels confident that the future will show greatly increased sales.

THE LOCKE INSULATOR MANUFACTURING COMPANY, Victor, N. Y., has recently placed upon the market a new type telephone insulator for use when the lines run adjacent to or are erected on the same poles with high potential circuits. This is known as the No. 8a transposition insulator. Its features of particular interest are the great distances between the wire holding grooves and the screw threaded support for attachment to the pin. A long petticoat is also provided to afford the maximum surface distance between the two wires. This insulator should prove of great value to companies operating lines adjacent to power circuits, as its high insulation will offset any troubles due to grounds. Further details will be furnished by the company.

THE JOHN A. ROEBLING'S SONS COMPANY, Trenton, N. J., has recently issued from its own press a small volume devoted to cableways, tramways, suspension bridges, inclined planes and cable railways. Many attractive and interesting illustrations of suspension bridges and other cable structures are shown which have been built by this firm. Each is accompanied by a short description giving details of its construction. The Roebling Company was the first to advocate suspension bridges supported by cables and has since developed this phase of engineering to a point where it is considered to possess advantages not found in other types of bridges.

Their work will be considered interesting by telephone men who are confronted with problems arising in connection with the carrying of wires or cables in long spans across rivers or other natural features which require very long distances between supports.

WILLIAM D. GHERKEY, the well-known engineer and conduit contractor, has recently moved to more commodious quarters in the Heed Building, 1211-13-15 Filbert street, Philadelphia. He issues this notice to his friends in the trade and requests that in future all mail be sent to his new address.

THE CENTRAL ELECTRIC MANUFACTURING COMPANY has recently put in operation its new plant at Rock Island, Ill. The company will manufacture a new product known as the Black Hawk dry battery. The manufacturers claim for it very high efficiency.

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Short Talks by the Schaper Man

No. 1.

Gentlemen: In addressing you I fully appreciate the fact that you are representatives of the telephone business world. I am therefore certain that you will understand my statements. As a business man myself I early learned that to get customers and to keep them required not only honest methods, but also a minute knowledge of the business for which my goods were made, and so I worked incessantly, studying a point here, analyzing a condition there, and all the time devising ways and means to make my goods not only as good as the best, but better. I went to the factories and mills and got in touch with the men who did things. I asked questions and experimented to find out whether a device could be made better and cheaper. Now I wish you to understand that the cheapening process was not considered unless an improvement could be made, and even then great care was exercised to make no mistakes. You may possibly think this was a waste of time when the material to be manufactured was only iron. Did you ever stop to consider the number of different grades of iron there are? Do you know that one grade is suitable for only one kind of work, and that almost all devices which differ in usage require different qualities of metal? It's a fact, though, and that is why I have been so careful to see that only the right grade of iron has been used for any device. I don't wish to take up your time any further, as I know you are busy, but I would like to have you write me, and I'll send you further particulars and give you prices on anything you want in the way of line hardware, my specialty. I thank you for your kind and considerate attention. In the future I hope to be able to talk to you about galvanizing, and I may have a few words to say about our shipping facilities and other details of our business which I am sure will interest you.

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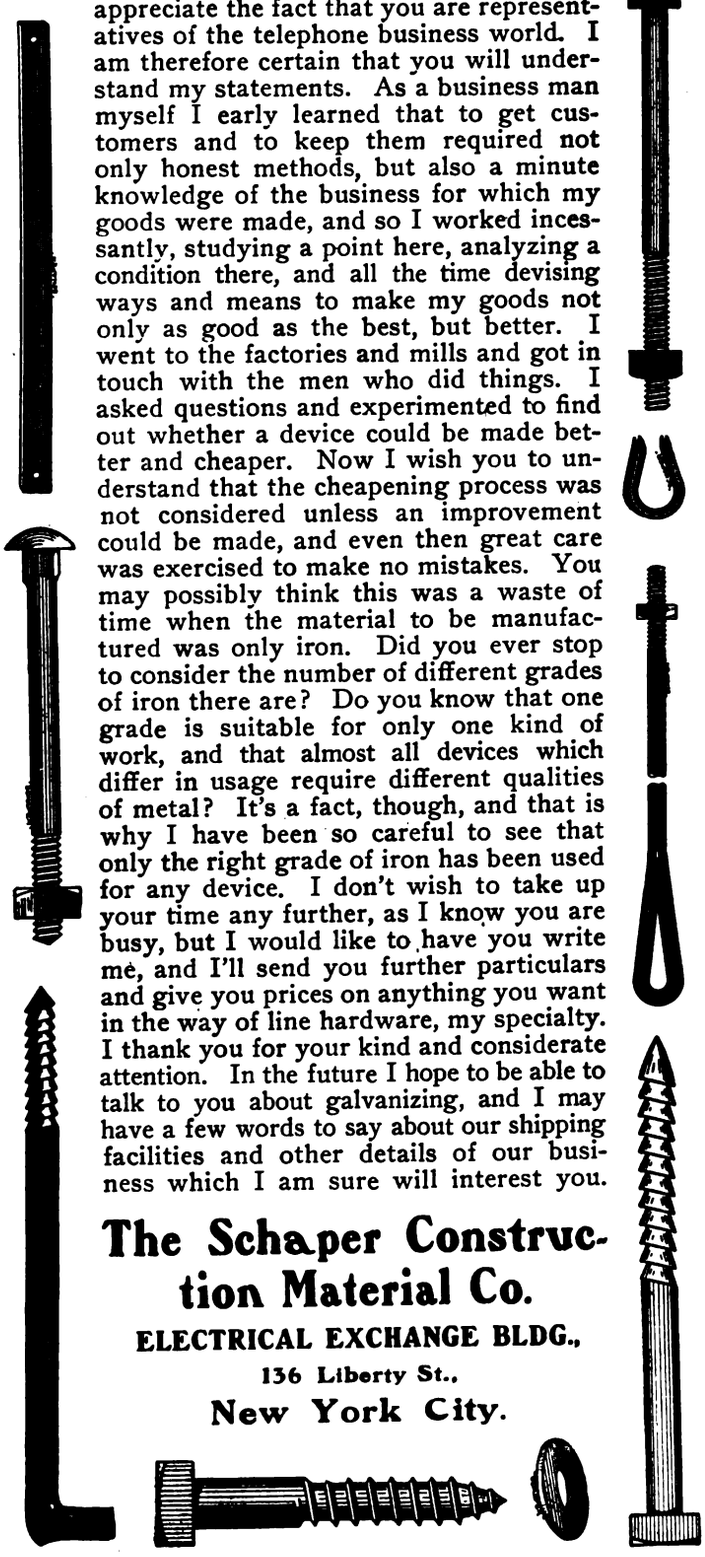

When a $50,000 Salary Went Begging

It is stated upon good authority that when General Kitchener conquered the Soudan, he looked in vain for a technically trained man to take charge of the affairs of the country and to whom he was willing to guarantee a salary of $50,000 a year.

The Bell telephone companies throughout the country are hiring all available, technical college graduates.

The unparalleled growth of the Independent telephone movement has made it imperative that the men in charge shall have a thorough technical training.

Telephone Engineers are in greater demand than any other class of technically trained men.

If you are satisfied with your present position these illustrations will not interest you; but if you have ambitions, write to the *American School of Correspondence* and get particulars of its telephone course by mail. Your future depends largely upon your present actions, therefore act.

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Amer. Tel. Jour., Dec. 23, '05.

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FINANCIAL.

GALESBURG, ILL.—The Galesburg Union Telephone Company has increased its capital stock from $150,000 to $250,000. The money will be spent in improving its system.

FARMINGTON, CONN.—The Farmington Valley Telephone Company has increased its capital stock from $27,000 to $50,000.

NEWARK, O.—The Newark Telephone Company now has its stocks and securities listed with the Columbus stock exchange, the board of governors having so decided on application of the company for a listing. The company is capitalized at $60,000 of common and $40,000 preferred stock and an additional $50,000 preferred stock will soon be issued for the purposes of improvement. The common stock is paying 6 per cent. interest and the preferred stock 6 per cent. dividends. There is a bonded indebtedness of $35,000 which instead of being provided with a sinking fund is extinguished at the rate of $5,000 a year.

OIL CITY, PA.—The quarterly dividend of 1½ per cent. on preferred stock of the Petroleum Telephone Company was declared and paid December 1, 1905.

MANSFIELD, TEXAS.—The Mansfield Telephone Company has increased its capital stock from $8,000 to $16,000.

FRANCHISES.

OAKLAND, CAL.—The Home Telephone Company, of Los Angeles, has obtained a franchise at Oakland.

WOODLAND, CAL.—It is quite probable that the Home Telephone Company, of Los Angeles, Cal., will endeavor to obtain a franchise at Woodland.

GREENSBORO, N. C.—The North State Telephone Company, of High Point, has made application for a franchise at Greensboro.

ATTICA, N. Y.—The Attica Home Telephone Company has been granted a franchise at Attica.

ATTICA, N. Y.—The Inter-Ocean Telephone Company, of Buffalo, has secured a franchise in Attica.

HOMER, N. Y.—The Inter-Ocean Telephone Company, of Buffalo, has made application for a franchise at Homer.

COMBINATIONS.

KAHOKA, MO.—The Mississippi Valley Telephone Company has recently taken possession of the Kahoka Independent exchange, which was formerly owned by J. C. Hubinger.

ALBANY, N. Y.—The Independent Telephone Company, of Herkimer, has been sold to the Independent Union Telephone Company of Albany. The system transferred to the Albany company is located in the towns of Herkimer, German Flats and Little Falls.

ARTESIA, TEXAS.—A deal has been consumated whereby Dave Runyan, of Artesia, and Morgan Davis, of Hope, have come into possession of a half interest in the long distance telephone line from Artesia to Roswell and from Artesia to Hope.

ELECTIONS.

MORRISON, ILL.—The Whiteside Mutual Telephone Company has elected the following officers: President, Will Boyd; vice-president, H. L. Ewing; secretary, C. E. Johnson; treasurer, R. E. Cochran.

DANSVILLE, MICH.—The Dansville, Vantown & Williamston Citizens' Mutual Telephone Company has elected the following officers: President, Lewis Austin; vice-president, Henry Culver; secretary, Chas. Brownell; treasurer, Jerome Weston.

JAMESTOWN, N. Y.—The Home Telephone Company has elected the following officers: Arthur C. Wade, president; Wm. J. Maddox, vice-president; T. S. Lane, secretary and treasurer; J. H. Wright, general manager.

PALESTINE, TEXAS.—At a recent meeting of the directors of the Palestine Telephone Exchange Mr. J. B. Hamilton resigned as secretary and treasurer and was elected vice-president. Mr. R. H. Hughes was elected as a director and was also appointed secretary and treasurer.

NEW COMPANIES.

ST. ANTHONY, IDAHO.—An Independent telephone company, with headquarters at St. Anthony, has been organized. The company will build into the country above mentioned and on through to Jackson's Hole.

QUINCY, ILL.—The Quincy Long Distance Telephone Company has recently been incorporated with a capital stock of $2,000; incorporators, Frank J. Penwick, J. R. Pearce, Samuel F. Scott.

DANA, IND.—The Indiana Telegraph & Telephone Company has been incorporated with $50,000 capital stock.

MACKSBURG, IA.—The Madison County Mutual Telephone Company, with its principal place of business at Macksburg, has been incorporated with a capital stock of $2,500. It will acquire the system now owned by the Harris Mutual Telephone Company, of Grand River and adjoining townships in Madison county.

WINCHESTER, IND.—The Eastern Indiana Telephone Company has been incorporated with a capital stock of $150,000. The directors are Baden S. Hunt, Jas. S. Engle and A. L. Nicholas.

HARPER, KAS.—A farmers' telephone line, running into Harper, has been organized with the following offiecrs: President, L. A. Heck; secretary, J. N. Baker; treasurer, D. E. Boleman.

PORTLAND, ME.—The Jacksonville Railway & Light Company has been organized at Portland for the purpose of constructing, owning and operating railway, telephone and telegraph lines. Capital stock $500,000. President, Geo. F. Duncan, of Portland; treasurer, Edward Woodman, of Portland.

MOUNT ZION, MO.—The Mount Zion Telephone Company has been incorporated with a capital stock of $4,800. Incorporators: J. D. Snyder, J. W. Stanton, T. H. Good, J. N. Butler, E. P. Edwards and others.

HAVRE, MONT.—The Havre-Boxelder Telephone Company has been incorporated with a capital stock of $50,000. President, J. S. Almas; vice-president. J. F. Valadon; secretary and treasurer, Henry J. Heili.

FREMONT CENTRE, N. Y.—The Fremont Centre Telephone Company has been organized. President, George Sipple, Mileses; secretary, W. P. A. Emrich; treasurer, R. Whitmore; manager, M. Swickhart.

BELLEVUE, O.—The Bellevue Telephone Company has been reorganized. President, Frank A. Knapp; vice-president, H. C. Stahl; secretary, Fred Wolfrom; treasurer, C. R. Callaghan.

CINCINNATI, O.—The Queen City Home Telephone Company, of Cincinnati, has been incorporated. Harry Gates, of the Queen City Telephone Company, and George W. Beers, of Ft. Wayne, Ind., are among the incorporators.

LOWELL, O.—The L. H. W. Telephone Company has been incorporated with a capital stock of $10,000. Incorporators are, W. H. Davis, C. F. Shinn, J. D. Snyder, John Mattern, Dan Honnoman.

CESTOS, OKLA.—The Independent Telephone Company, of Cestos, has been incorporated with a capital stock of $25,000. The incorporators: J. W. Korns, F. C. Hoyt, H. A. Seaton.

DAVENPORT, OKLA.—The Ridley Telephone Company, located at Davenport, Okla., has been incorporated with a capital stock of $5,000. The directors are: R. C. Ridley, W. R. Ridley and C. A. Ridley, all of Davenport.

GUTHRIE, OKLA.—The Cottonwood Valley Telephone Company, of Guthrie, has been incorporated with a capital stock of $325,000. The incorporators are W. H. Chappell, A. Ellison, G. W. Omart, G. W. Gaffney, W. H. Body and S. H. Oleson.

NEWS—WANTED

THE matter contained upon the Message and Operating Field pages of this paper is contributed largely by our special correspondents. We believe, however, that there are many valuable items of telephonic interest which are never brought to the attention of the public. There is no reason why this condition should exist, and the Editor, therefore, invites all telephone companies, and the officials of such companies, to furnish any information that they can consistently make public relative to financial statistics, new construction, elections, franchises and personal items.

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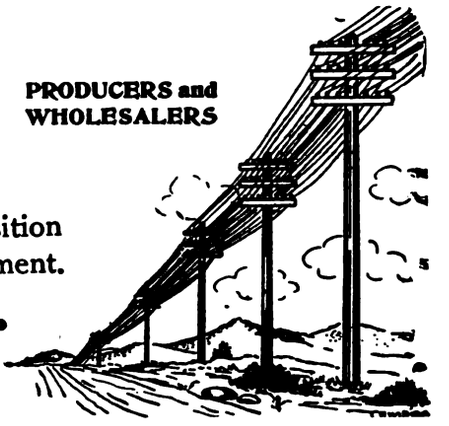

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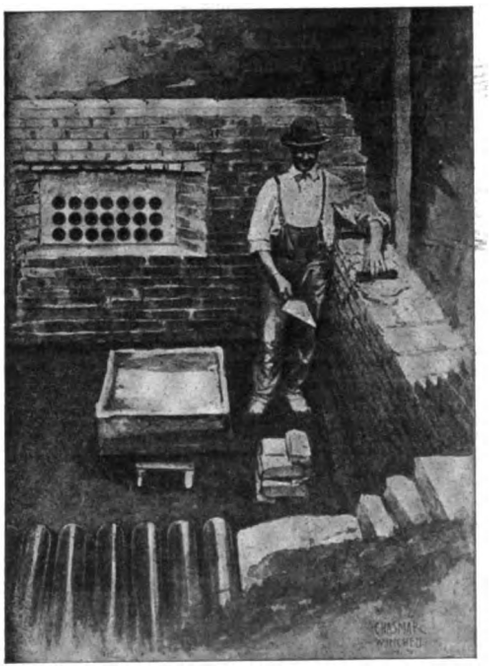

The American Conduit Company has a corps of experts in underground construction and is prepared to furnish supervision of work if desired. We would prefer to co-operate with contractors in underground construction, but if desired will submit estimates and bids and take contracts for completed underground systems in any part of the United States or Canada.

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THE WEEK'S MESSAGES

BURLINGTON, PA.—The telephone line which is to go from Burlington to Luthers' Mills, connecting with the Luthers' Mills Franklin line, has been revived and reorganized under the name of the Wonder Worker Mutual Telephone Company.

BRENHAM, TEXAS.—The Brenham & Washington Telephone Company, of Brenham, has been incorporated with a capital stock of $1,500. Incorporators: W. C. Bohne, Theodore Schawe and others.

PERSONAL.

H. C. BROWNLEE has been appointed manager of the Alameda exchange of the Sunset Telephone and Telegraph Company.

M. E. DARNELL, of Carrollton, Mo., has been elected general manager of the Bluff City Telephone Company at Hannibal, Mo.

E. J. ELLIS has been appointed manager of the exchange at Elkhart, Ind., by the Central Union Telephone Company.

HERBERT A. HUFF has been elected treasurer of the Eldora Mutual Telephone Company, of Eldora, Ia.

JOHN ROLSTON, of Fargo, N. D., has been appointed wire chief for the territory in the northern part of the state by the Northwestern Telephone Exchange Company.

VERMONT WALTERS, formerly with the Toledo Home Telephone Company, has been appointed manager at Washington, Ind., by the Daviess County Home Telephone Company.

MISCELLANEOUS.

NAUVOO, ILL.—The Nauvoo Independent Telephone Company, which is owned by Dr. Bortz, and was formerly a Bell sub-licensee, has severed its connection with the Bell Company and is now connected with the system of the Mississippi Valley Telephone Company, at its Ft. Madison exchange.

GERMANTOWN, O.—At a meeting of the board of directors of the Germantown Independent Telephone Company, it was decided that the Central Union toll connection would be severed January 1, 1906, and notice be given the Bell Company to that effect. The company has had Bell connections about six months. A new Independent line has been constructed to the Dayton and Miamisburg Home plants.

New Construction in the Field

NOME, ALASKA.—The Seward Co-operative Telephone Company intends extending its lines north, up the Yukon River to Fairbanks, and thence to Valdez.

BLACKFOOT, IDAHO.—The Blackfoot Telephone Exchange is to remodel its lines in Blackfoot.

CEDARVILLE, ILL.—The Cedarville-Stephenson County Telephone Company is to construct additional lines.

PEORIA, ILL.—The Farmers' Mutual Telephone Company is building a line from El Paso to this place.

CANNELTON, IND.—The Independent company which obtained a franchise under the name of the Cannelton, Branchville and Eckerty Telephone Company has begun the erection of a plant and will soon have an exchange ready for local and county service.

COLUMBUS JUNCTION, IA.—The Muscatine-Louisa County Telephone Company will establish an exchange at Columbus Junction.

HOUGHTON, IA.—The German-American Telephone Company is constructing a line from Houghton to La Crew. The company will also soon extend its line east of Mt. Hamill.

LETTSVILLE, IA.—W. W. Wagner is installing a telephone system, and has made arrangements to connect with the system of the Mississippi Valley Telephone Company at its Muscatine exchange.

MARION, IA.—The Marion, C. R. and Linn County Telephone Company is building a new line north from Springville.

ROCK VALLEY, IA.—The Rock Valley Telephone Company is improving its system.

MAYFIELD, KY.—The Home Telephone Company, of Louisville, is contemplating the installation of a telephone system at Mayfield. The company has purchased an Independent line from Paducah to Viola, via Folsomdale, also the Lilly Telephone holdings, and these lines will be included in the Mayfield chain.

EVERETT, MINN.—The Mesaba Telephone Company, which has recently installed an exchange at Virginia, is to establish an exchange at Eveleth.

FAIRMONT, MINN.—The Fairmont Telephone Company contemplates the construction of lines to Ceylon, Wilbert, Dunnell and other points.

RIDGEWAY, MINN.—The Midway Telephone Association is building a line from New Hartford to Ridgeway.

LEWISTON, MONT.—The Lewiston Telephone Company is rebuilding its line to Great Falls, and entirely reconstructing its local system. About $100,000 will be spent in this work.

FREMONT CENTER, N. Y.—The Fremont Center Telephone Company is constructing a telephone line at Fremont Center.

MECHANICSVILLE, N. Y.—The Commercial Telephone Company, of Troy, is to build a line to Mechanicsville.

ONEONTA, N. Y.—The Independent Telephone Company is building a line between Cooperstown and Oneonta. The company is also improving its line between West Oneonta and Morris.

TROY, N. Y.—The Citizens' Telephone Mutual Company, of Troy, is to make connection at Ulster with the Bradford County Telephone Company.

ALLIANCE, O.—The United States Telephone Company, of Cleveland, is building a line from Alliance to Youngstown.

CYGNET, O.—Harry E. Graham, head of the Oil Belt Telephone Company, set his new plant in operation the first of the month, starting with a list of about 150 subscribers. The same company also has the plant at Portage, O., where it has a system extending to about 200 subscribers, this latter plant having been set in operation about a year ago. Mr. Graham expects to extend the service of his company to Rudolph, another very enterprising town, to Galatea, Bays and Mermill. All these towns are in Wood county and are very enterprising oil and gas points. Mr. Graham is also at the head of the Ney Telephone Company, of Ney, O., having purchased this plant a little over two months ago. He is at present busily engaged in making extensions into the surrounding country.

EATON, O.—The Eaton Telephone Company has now a direct line to Richmond, Ind., Greenville, O., and Dayton, O.

SALEM, O.—The Columbiana County Telephone Company is constructing new lines.

WEST ALEXANDRIA, O.—The Preble County Telephone Company is developing the territory about West Alexandria. It has added a direct connection with Brookville, New Lebanon, Dayton, besides the copper connection of the United States Long Distance Line.

YOUNGSTOWN, O.—The Youngstown Telephone Company is putting in branch exchanges all over the county.

BIRD-IN-HAND, PA.—The Enterprise Telephone & Telegraph Company, of Enterprise, is to build a line to Bird-in-Hand. The company has recently established connection with Alert, South Hermitage and Cambridge.

LEBANON, PA.—The Lebanon Telephone Company has almost completed its line to Middle Valley and will also extend the line to Farmersville.

BEAUFORT, S. C.—The Peoples' Telephone Exchange is installing its new equipment.

CANTON, S. D.—The Canton Co-operative Telephone Company is extending its lines.

LAFOLLETTE, TENN.—Under a bond of $150,000, the LaFollette Water, Light and Telephone Company has closed a contract to have the lighting and telephone plants in full operation by April 1. Citizens are greatly pleased over the success of the promoters of these much needed improvements.

AMERICAN FORK, UTAH.—The Independent Telephone Company is to construct a line from American Fork to Lehi, operating the towns of Lehi and Pleasant Grove from the central station at American Fork.

SOUTH ROYALTON, VT.—The Rapid Telephone Company is extending its lines.

FERNDALE, WASH.—The Merchants' Telephone Company is installing an exchange at Ferndale.

WHEELING, W. VA.—The National Telephone Company has obtained from the government a permit to lay a cable system across the Ohio River from Benwood to Bellaire. Work on laying the cables will start at once. This will provide a substantial improvement in the trunking facilities between the two cities.

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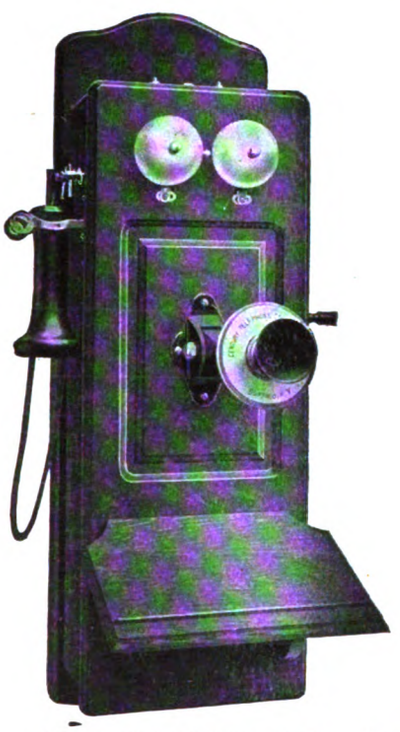

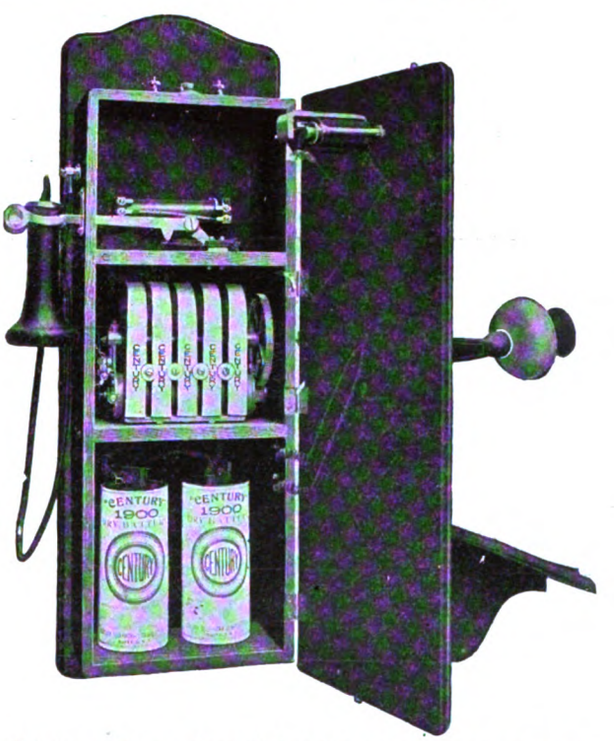

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Therefore, is it not good policy to use nothing but the very best apparatus?

Our No. 65 magneto telephones will give your subscribers the very best service. Their use will also increase your dividends by reducing to the minimum your maintenance charges.

Our No. 65 magneto telephones have been carefully developed and perfected to such an extent that they can be relied upon for perfect service at all times.

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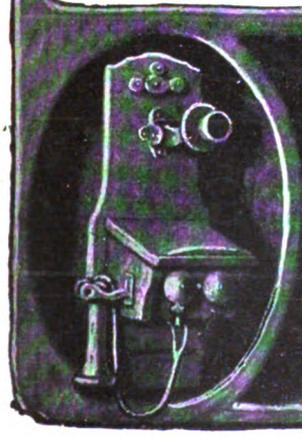

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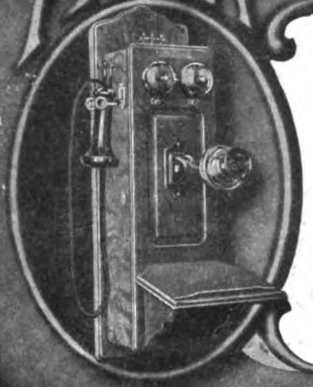

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MONARCH APPARATUS

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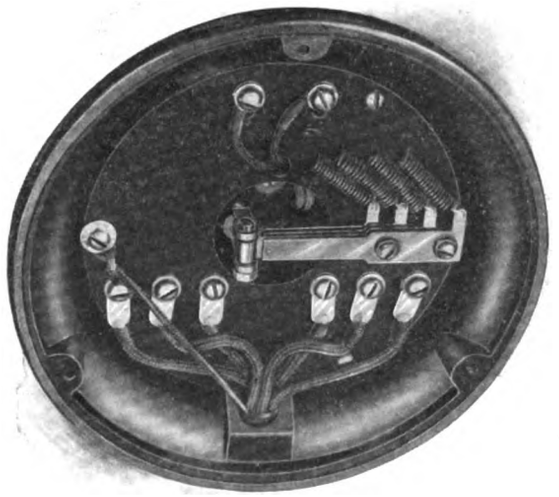

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During this year (the Dean Electric Company's first year of switchboard manufacturing), we have made and entered orders for seventeen (17) complete common battery exchange equipments, each provided for full selective party line operation.

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This for a new concern is an unprecedented record. There must be a reason.

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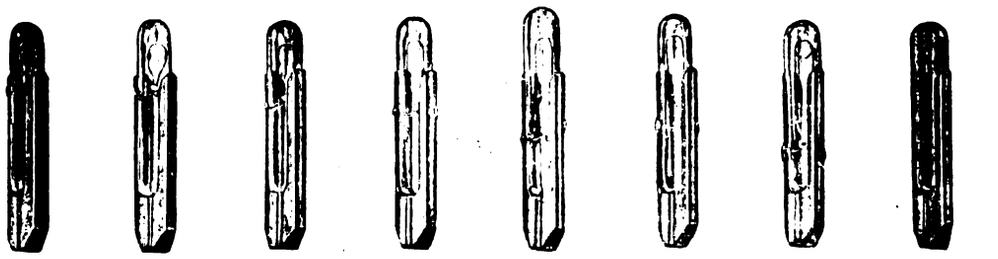

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3.—**THE FILAMENT IS VERY DURABLE.** They are manufactured by our special process, which produces exceptionally strong, uniform, and long lived carbon.

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5.—**THE LAMPS HAVE THE HIGHEST VACUUM OBTAINABLE.** This gives long life and greatly reduces the conduction of heat from the filament to the jack.

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4	.2	.2
4	.2	.4
5	.2	.15
6	.2	.15
10	.2	.1
12	.2	.1
14	.2	.1
16	.2	.1
20	.3	.1
24	.3	.075
30	.3	.085
40	.5	.085
48	.6	.075

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Chicago Brass Co..... 38
Chicago Solder Co..... —
Chicago Wire Chair Co..... 14
Columbia Electric Co..... —
Connecticut Teleph. & Electric Co. 10
Cook, Frank B. ..... —
Crumb, W. H., & Co..... 38

Dayton Mfg. Co..... 9
Dean Electric Co..... 7
Doubleday-Hill Electric Co..... —
D. & T. Anchor Co..... 32

Edwards Hine Co..... 33
Electrical Trades Exposition Co... 34
Electric Appliance Co..... 3
Electric Storage Battery Co..... 3
Elliott Company ..... —
Ewing-Merkle Electric Co..... —

Fahnestock Electric Co..... 14
Farr Tel. & Const. Supply Co.... 6
Fisk Newhall Tel. Mfg. Co..... —
Frankel Display Fix. Co..... —

General Storage Battery Co..... 38
Gest, G. M..... 39
Glenn Kline Lumber Co..... 37
Gray Telephone Pay Station Co... 32
Guarantee Telephone & Equip. Co.. 2

Hallett Iron Works..... 3
Hanson, C. H..... 1
Hawkins, W. W..... 38
Hemingray Glass Co..... —

India Rubber & Insulated Wire Co. 1
International Telephone Mfg. Co.. 2

Kellogg Switchboard & Supply Co. .....8 and 36
Kemp, R. W..... 1
Klein, Mathias, & Sons..... 37

Lanz, M., & Sons..... 38
Leeds & Northrup Co..... —
Lindsley Bros. Co..... —

McMeen & Miller..... 38
Merritt & Co..... 38
Miller Anchor Co..... 9
Monarch Electric & Wire Co..... —
Monarch Telephone Mfg. Co..... 6
Mountain State Electric Co..... 3
Mueller, William, Co..... 37

Nagel, W. G., Electric Co..... 9
Norfolk Creosoting Co..... 37
North Electric Co..... 4

Okonite Co. ..... —

Pendleton & Gilkey..... 37
Piedmont Elec. Co..... 1
Pignolet, L. M..... 38
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Plume & Atwood Mfg. Co..... 1
Porter Cedar Co..... 37

Roebling, John A., Sons Co..... 6
Roth Bros. & Co..... 35
Runzel Lenz Elec. Mfg. Co..... —

Sand Point Cedar Co..... 36
Sandwich Pole Changer Co..... 33
Schaper Construction Material Co. 10
Simplex Electric Co..... 1
Standard Underground Cable Co.. —
Stanton, L. W..... 1
Sterling Electric Co..... 11
Sterling, W. C., & Son..... 37
Stromberg-Carlson Tel. Mfg. Co., 12, 13 and 37
Stroud, H. D..... 38
Sumter Tel. Mfg. Co..... 35

Telephone Printing Co..... 1

United Teleph. & Switchboard Co. —

Vought Berger Co..... —

Wanted, Situation, etc..... 32
Waterbury Company 1
Wesco Supply Co..... —
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Weston Electrical Instrument Co.. 38
Willyoung & Gibson Co..... 35
Wilson, J. I. M..... 37
Wire & Telephone Co. of America. 1

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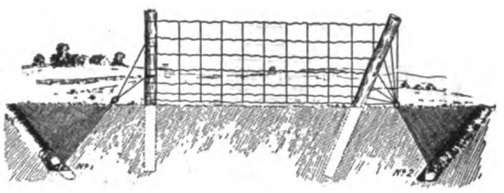
MADE OF MALLEABLE IRON



"HERCULES" Anchors are easy set.

"HERCULES" Anchors pull against solid earth.

"HERCULES" Anchors are strongest made.

"HERCULES" Anchors will not creep.

Send for Prices and Circulars

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"They Never Pull Up"

THE MILLER ANCHOR CO.

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51 DEY STREET - NEW YORK

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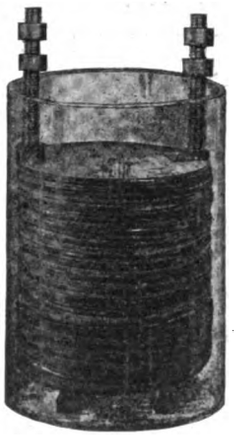

"The battery is giving fine service; we would not take double what we paid for it if we could not get another set to take its place."—This enthusiastic exchange manager has a

SILVEY TYPE "R" STORAGE BATTERY

UP TO DATE TELEPHONE MEN HAVE CATALOGUE 126 ON THEIR DESK.

THE DAYTON MFG. CO.
DAYTON OHIO

Belden Silk Magnet Wire

Our business has been built on the **good quality** of our Magnet Wire. Making the smaller sizes of silk wire is a business by itself and in this we have specialized.

THE RESULT

Sales 1902-1903 ———
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TRY US AND BE CONVINCED

BELDEN MANUFACTURING COMPANY
194 MICHIGAN STREET
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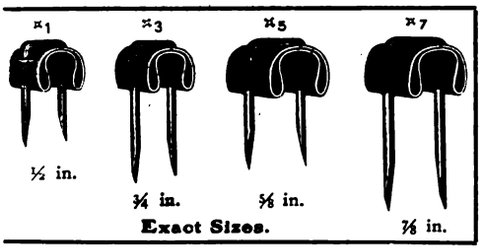
Blake Insulated Staples



Exact Sizes.

are a standard, square shouldered staple having good driving qualities. The Fibre Insulation cannot come off in driving.

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AND HOW TO~ STOP IT~

THEY WANT MORE

They Always Do

Read it for yourself : :

CITIZENS TELEPHONE COMPANY

DECATUR, IND., Oct. 2, 1905.

Baird Manufacturing Co., Chicago, Ill.

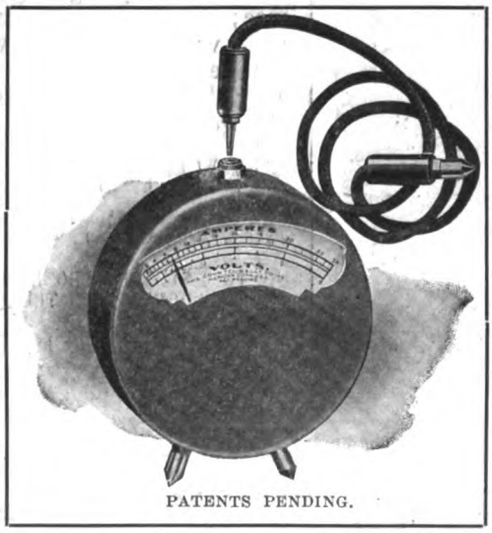
Gentlemen: Enclosed please find draft for $420.00 in payment of your invoices of August 24 and August 28.

You will please ship via P. F. W. & C. two dozen of your selective telephones; if you cannot ship all immediately, let us have one dozen at once and the others as early as practicable, and oblige,

Yours truly,
CITIZENS TELEPHONE CO.,
F. M. SCHURMEYER, Sec.

Baird Manufacturing Co. 6 Michigan St. CHICAGO

VOLT AMMETER, $5.00
AMMETER ONLY, $3.50



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PATENTS PENDING.

"CONNECTICUT" VOLT AMMETER

For testing batteries in connection with telephones, electrical instruments, automobiles, gasoline engines, etc.

ACCURATE, DURABLE, GUARANTEED!

NOTE.—If even one cell is worn out the efficiency of the others are lost. You can't locate this one without the volt ammeter.

WILL SAVE ITS COST IN A SHORT TIME.

Conn. Telephone & Electric Co.

MERIDEN, CONN., U. S. A.

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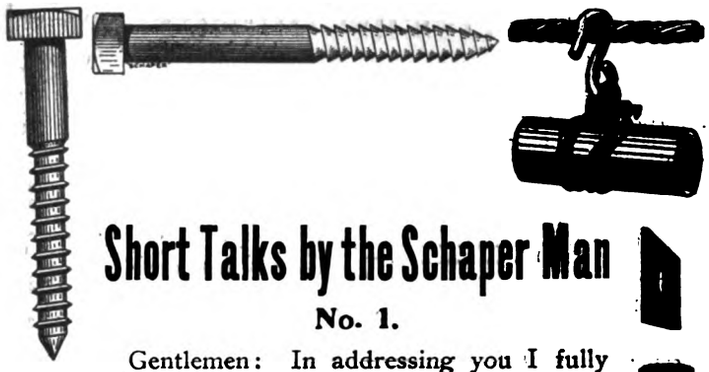
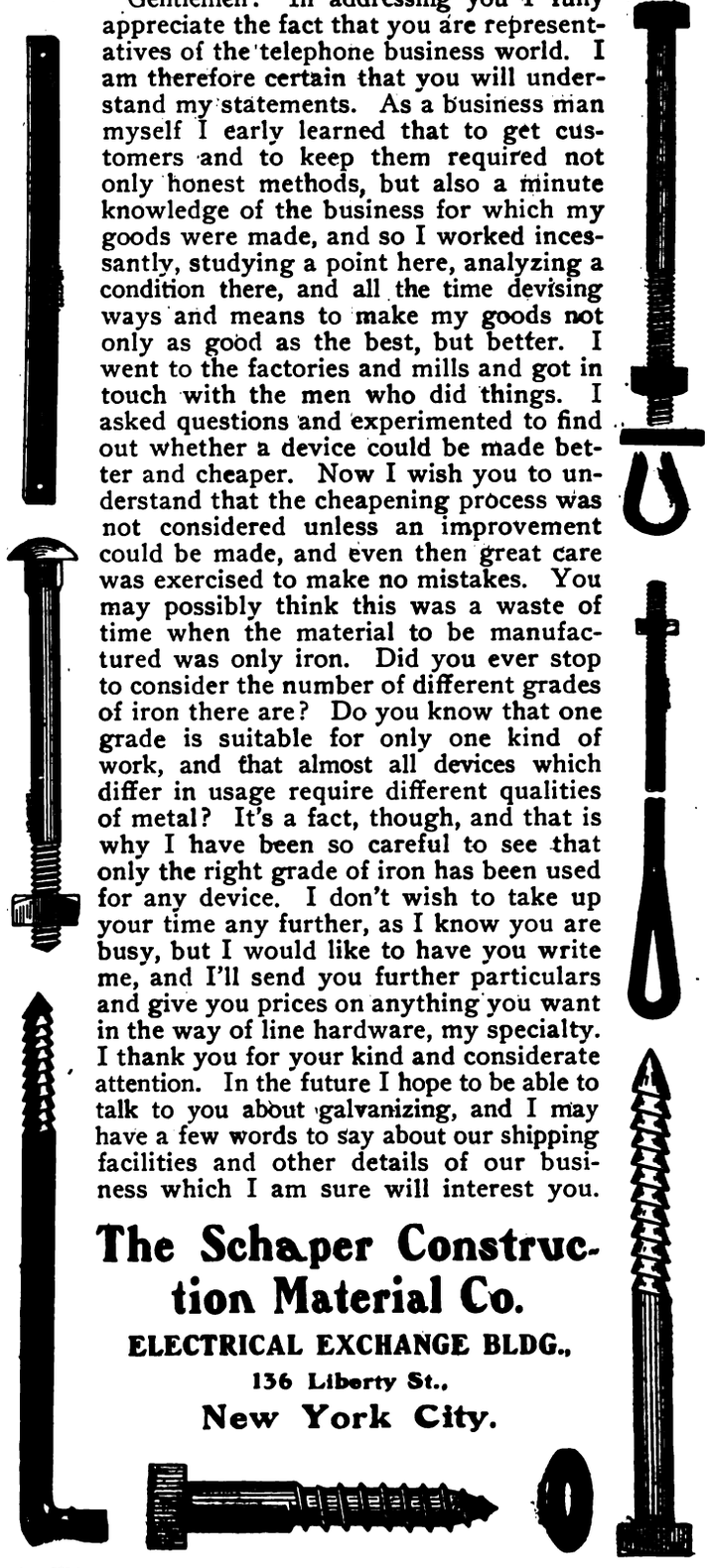


Short Talks by the Schaper Man

No. 1.

Gentlemen: In addressing you I fully appreciate the fact that you are representatives of the telephone business world. I am therefore certain that you will understand my statements. As a business man myself I early learned that to get customers and to keep them required not only honest methods, but also a minute knowledge of the business for which my goods were made, and so I worked incessantly, studying a point here, analyzing a condition there, and all the time devising ways and means to make my goods not only as good as the best, but better. I went to the factories and mills and got in touch with the men who did things. I asked questions and experimented to find out whether a device could be made better and cheaper. Now I wish you to understand that the cheapening process was not considered unless an improvement could be made, and even then great care was exercised to make no mistakes. You may possibly think this was a waste of time when the material to be manufactured was only iron. Did you ever stop to consider the number of different grades of iron there are? Do you know that one grade is suitable for only one kind of work, and that almost all devices which differ in usage require different qualities of metal? It's a fact, though, and that is why I have been so careful to see that only the right grade of iron has been used for any device. I don't wish to take up your time any further, as I know you are busy, but I would like to have you write me, and I'll send you further particulars and give you prices on anything you want in the way of line hardware, my specialty. I thank you for your kind and considerate attention. In the future I hope to be able to talk to you about galvanizing, and I may have a few words to say about our shipping facilities and other details of our business which I am sure will interest you.



The Schaper Construction Material Co.

ELECTRICAL EXCHANGE BLDG.,
136 Liberty St.,
New York City.

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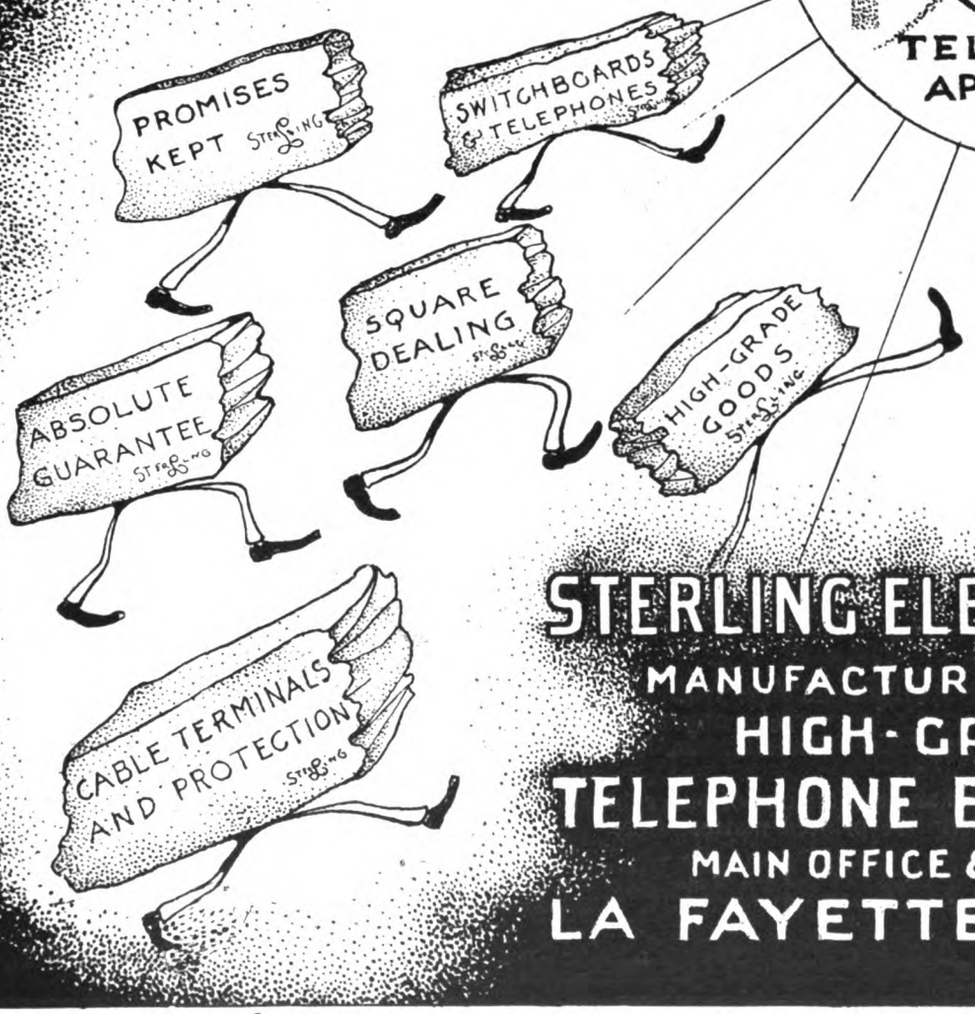
START THE NEW YEAR RIGHT

STEPPING STONES TO SUCCESS

HIGH GRADE STERLING ELECTRIC COMPANY TELEPHONE APPARATUS



STERLING ELECTRIC CO.

MANUFACTURERS OF HIGH-GRADE TELEPHONE EQUIPMENT

MAIN OFFICE & FACTORY

LA FAYETTE, INDIANA

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The Switchboard You Should Buy

Because it will enable your present operating force to handle nearly twice as many lines. That's just what our Generator Call Visual Signal Switchboard will do and any of our customers using this type of equipment will gladly tell you so if you care to write them.

The above is one of our standard cabinets with this equipment. It shows how the line signals are mounted, how easily additions can be made or any signal removed if desired.

Rapid in operation, inexpensive to maintain. In fact, the maintenance, compared with the service the board gives, is practically nothing.

Let us make you a proposition on some one of our cabinets with this type of equipment.

We will gladly mail descriptive printed matter free.

Stromberg-Carlson Telephone Manufacturing Company

ROCHESTER, N. Y. " " " CHICAGO, ILL.

Please mention THE AMERICAN TELEPHONE JOURNAL when writing to ADVERTISERS.

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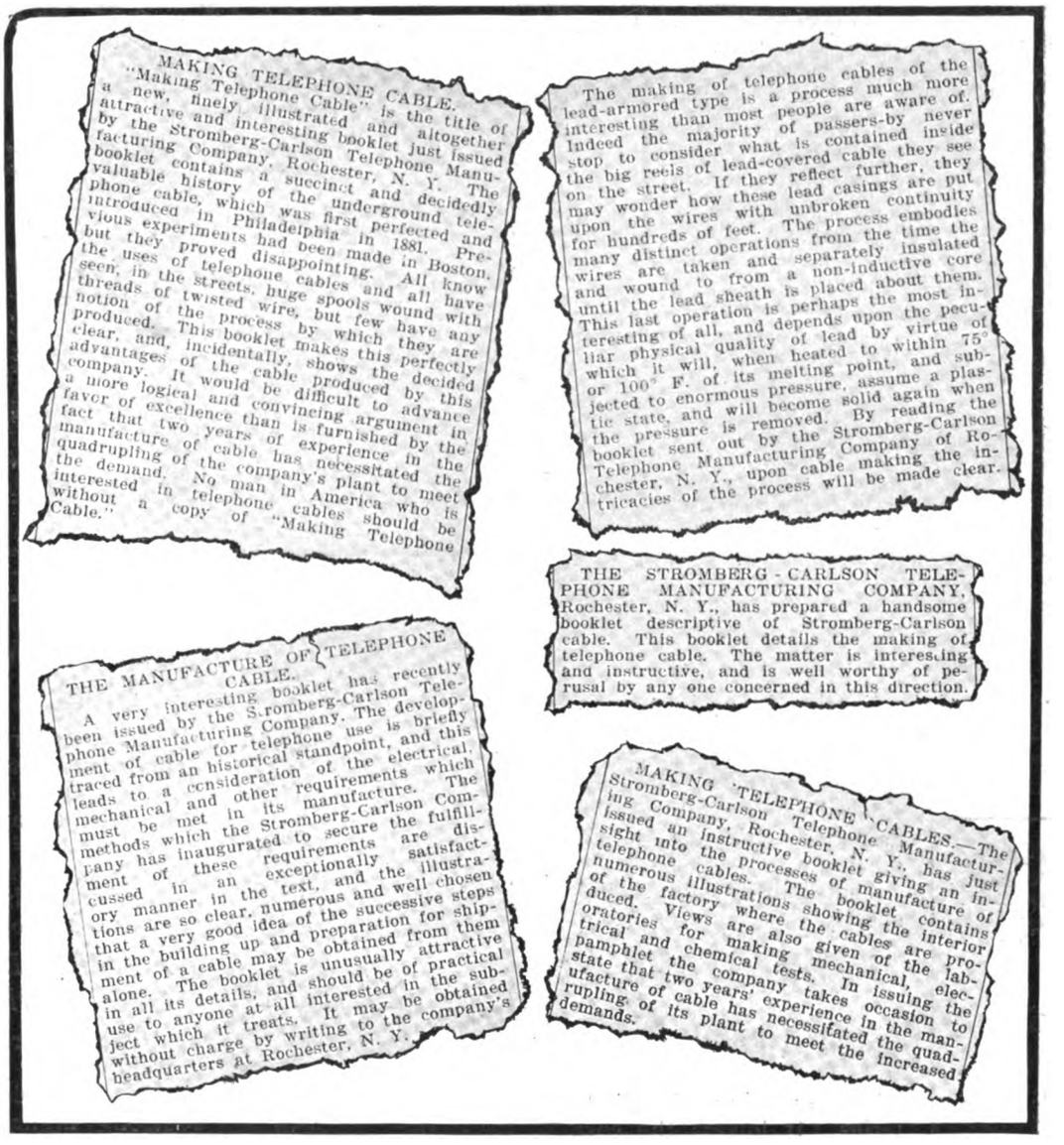
WE MAKE CABLE

YOU SHOULD HAVE A COPY OF THIS BOOK



It Will Post You How to Buy Telephone Cable

WE MAIL IT FREE

Ask for Booklet No. 79-B.

STROMBERG-CARLSON TELEPHONE MFG'CO.

ROCHESTER., N.Y. CHICAGO., ILL.

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THE COLUMBUS EVENING DISPATCH. TUESDAY, OCTOBER 24, 1905

TELEPHONE SECURITIES BECOMING VERY POPULAR

That the Automatic Machine Is a Success Has Been Demonstrated Beyond a Doubt.

Caleb L. McKee & Co. says—"That the automatic telephone is a success has been demonstrated beyond a doubt, and the favor with which it has been received by the local public is indicated clearly by the upward movement in the securities of the Columbus Citizens' Telephone Co. At the beginning of the installation of the automatic switchboard the common stock was quoted at about 55 bid while at this time 75 is bid with nothing offered below about 85; the preferred has advanced from par to 107 bid with holders asking 111, and it seems likely to reach a much higher level."

Since Oct. 24th these stocks have gone up,—the common to par, the preferred to 113½, and they are scarce at that.

Our Automatic System did it—can do it for yours.

Why do you wait?

OUR AUTOMATIC SYSTEM ADOPTED IN THE FOLLOWING CITIES:

Chicago, Ill.
Grand Rapids, Mich.
Columbus, O.
Dayton, O.
Lincoln, Neb.
Portland, Me.
Auburn, N. Y.
Lewiston, Me.
Sioux City, Ia.
Cleburne, Tex.
Columbus, Ga.
South Bend, Ind.
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Portland, Ore.
Van Wert, O.
Battle Creek, Mich.
Clayton, Mo.
Pentwater, Mich.
Toronto Jct., Can.
Wilmington, Del.
Riverside, Cal.
Traverse City, Mich.
Auburn, Me.
Fall River, Mass.
New Bedford, Mass.
Los Angeles, Cal.
San Diego, Cal.
Hopkinsville, Ky.
Hazleton, Penn.
Woodstock, N. B.
St. Marys, O.
Westerly, R. I.
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Albuquerque, N. M.
Allentown, Penn.
Hastings, Neb.
Wausau, Wis.
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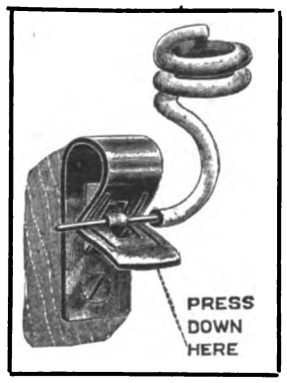
Havana, Cuba
Marianao, Cuba, and
Berlin, Germany.

AUTOMATIC ELECTRIC COMPANY
Van Buren and Morgan Streets, CHICAGO, ILL.

JUST CONSIDER

The small amount of time it takes for an inspector's salary to add 25 per cent. to the cost of the dry battery he is inspecting or connecting up.

That is maintenance cost and it ought to be considered as carefully as the first cost. It's just as important.



That is why you should specify

FAHNESTOCK
Spring Binding Posts

when ordering dry batteries. It lowers the cost of maintenance. It does this by doing away with loose connections, dirty contacts and broken wires. It not only saves your money, but it saves all the annoyance arising from these defects and it doesn't cost you a cent to have your batteries so equipped. Just write Fahnestock Spring Binding Post on your next order, no matter what make of battery you use, and insist that you get it.

Let us send you a sample post. It's free.

Fahnestock Electric Co.
132 HAVEMEYER ST., BROOKLYN, N. Y.

The Old Wooden Stool is Obsolete

It never really had a place and has always met with disfavor, because it was always breaking down.

There's just one thing that fills the bill and pleases the operators—

A METAL FRAME OPERATOR'S CHAIR

They're strong, light in weight and easily kept clean. Made of extra strong highest grade of steel. Good to look at, better to sit on.

Frame is finished in antique copper, seat and back in oak or mahogany finish. The height of the seat can be adjusted by the independent hand-screw and revolved without raising or lowering. "This is important feature."

Our Wire Furniture is Fine
Write for Prices and Descriptive Literature

Patent applied for.

The Chicago Wire Chair Co.
Manufacturers
70 N. Jefferson Street CHICAGO

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The American Telephone Journal

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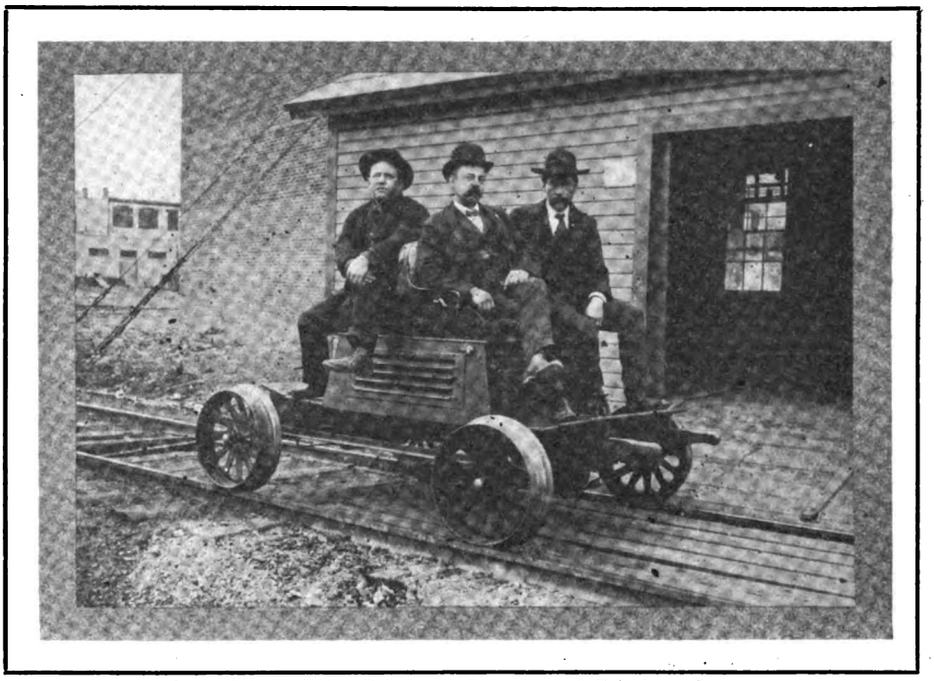
VOLUME XII *SATURDAY, DECEMBER 30, 1905* *NUMBER 27*

Telephone System of the Long Island Railroad

By Edward A. Tyler.

AMONG the many problems that have come before railroad men, the question as to whether the telephone can successfully take the place of the telegraph as a reliable means of communication has been attracting a continually increasing amount of attention. In view of this fact, it will prove of interest to learn of one instance where the telephone ranks first, and that, too, under the most difficult conditions of operation. The Long Island Railroad has recently installed a system which is unique in many respects, not only from the operating and construction standpoints, but on account of its diversified uses as a means of communication.

This railroad is at present reconstructing and electrifying a large part of its system on Long Island, N. Y. This work introduces many phases of operation and maintenance which are entirely foreign to the usual routine associated with roads which employ steam locomotives as the exclusive tractive agents. The distribution of the power and the absolute necessity for its uninterrupted delivery make necessary a scheme of communication which will enable the power house to be reached with the least possible delay in case of emergency. The telephone was naturally selected as being the one instrument which requires no expert knowledge for its operation and can, therefore, be used by any employee with equally good results.



Automobile Used for Patrol and Inspection of Telephone System.

In the telephone system designed to aid in the operation of the road, there are six different exchanges on Long Island, as well as branch boards in the ticket offices in New York City. The exchanges are located as follows: The main board in the office of the Electrical Superintendent, one in the office of the chief train dispatcher, one in the office of the tunnel engineers, and one board in the office of the road engineers, one in the main power house, and another at the railroad shops. The main board has a capacity of 100 lines, with two positions. Connected with these lines are 343 telephones, of which 219 are connected with the patrol system which parallels the high tension lines. There are 20 trunk lines to the local exchange of the New York and New Jersey Telephone Company, 5 to the New York offices of the Long Island Railroad Company, 22 to the power house and 2 to each of the other branch exchanges, except the dispatcher's board. This latter is a duplicate of the main board, and carries a multiple of all its lines and trunks. As magneto generators are used at subscribers' stations, the switchboards are of the usual design and equipment for magneto systems. Ringing current for signalling is supplied to the main exchange, and its duplicate also, over trunks from the local exchange of the telephone company. All the circuits terminate at a distributing frame equipped with the usual carbon plate and heat coil protection. Those that leave the train shed are carried in a 75-pair aerial cable to a dividing point on a pole 380 feet from the office. Here a 22-pair cable leads off to the power house, 1,000 feet distant, the run being made half aerial and half underground.

The switchboard at the power house has a capacity of 40 lines. Fourteen of these are local to the building and connect with the various offices, dynamo room, power, operating room, etc. One direct line is run to each of the five power substations, an additional party line connects with all of these power substations, and two trunks run to the main board, as well as two to the local exchange of the telephone company. Ringing current is supplied by a Holtzer-Cabot ringing machine. Worthy of note in connection with the power house equipment is the extreme care that has been spent in installing the apparatus. Where the telephones are mounted on marble walls, the wires are run concealed and only appear at the top of the instrument. Conduit is used throughout the building. Where desk instruments are used, ringing current from the machine is supplied over a separate circuit and a key installed to take the place of the hand generator.

The switchboards at the other three exchanges are of forty-line capacity and serve as terminal points for the local lines in the buildings. These exchanges use hand generators for signalling. Circuits on all these switchboards are of the ordinary type for magneto systems, ring-down line and clearing-out signals being used exclusively.

An outline of the extent of the cable plant may be given as follows: Starting at the pole where the first division occurs, and from which a cable is taken to the power house, as previously noted, a 34-pair aerial cable continues along the track for 2,000

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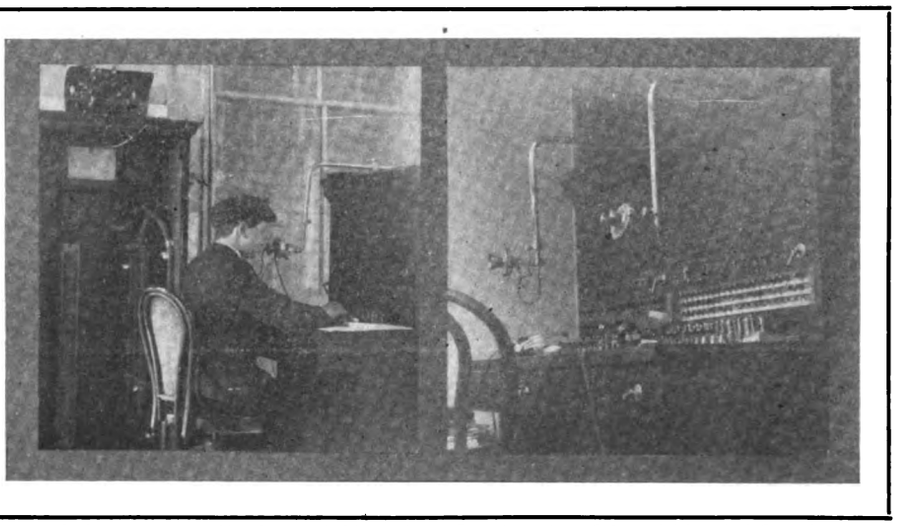
feet to a junction where it connects with a 24-pair cable. The run then continues in aerial cable for 3,290 feet and is there joined to a submarine cable of 40 pairs, used to cross a creek, a distance of 330 feet. A 24-pair aerial cable continues the circuits 31,780 feet to a point called East New York. Here two leads run off in different directions. A 22-pair underground cable extends for a distance of 26,400 feet, and beyond this the circuits are continued through aerial cable to Rockaway Junction, 8,768 feet. The other cable from East New York is of five pairs capacity, and runs for 20,000 feet underground to the Flatbush avenue terminal. The power substation at East New York is connected to this cable lead through 100 feet of five-pair cable. This constitutes the extent of the cable plant, with the exception of two small sections of submarine used at draw bridges along the route.

As the composition and construction of these cables differ from usual practice a few words may prove of interest concerning them. The conductors for the five-pair sections are all No. 16 B. & S. gauge. The 22-pair cables have conductors of varying sizes, as follows: 8 pair of No. 13, 6 of No. 16, and the rest of No. 19. The cables of larger capacity have the same number of No. 13 and No. 16 conductors as are found in the 22-pair cables, the remainder being No. 19. The reason for using the large sized conductors was to prevent any loss in transmission on account of the long distance operated through cable, besides the length of line covered by open aerial wires. Each cable conductor is provided with two wrappings of paper insulation, but these are laid in the same direction. This method of insulating, so it is claimed, prevents the paper being wound too tightly around the wire and permits a greater amount of air space, thus lessening the capacity between wires. The cable sheathing is composed of 98 per cent. of lead and 2 per cent. of tin. This composition is not affected by gas from the locomotives, although metal hangers had to be displaced by marlin on account of this trouble.



Magneto Switchboard and Distributing Cabinet. Main Switchboard in Office of Electrical Superintendent.

The exceptional precautions taken to prevent breakdowns or troubles of any description will be understood when it is stated that all open aerial lines are of No. 10 copper with O. K. weather proof insulation. A special transposition scheme was worked out to meet the difficulties to be overcome owing to the proximity of high tension, three phase transmission lines of 12,000 volts. Although in the greater part of the system the telephone wires and cables are supported upon the telegraph poles, on the opposite side of the track from the high tension wires, there are about 20 miles of open wire on the same supports with these wires. When the lines are supported on the same steel towers with the high tension wires, transpositions occur once every five poles. This number decreases as the distance between the telephone and power circuits increases. Where the telephone lines occupy the same poles as the power wires, they are placed about ten feet below them, with both wires on the same side of the pole, in the same vertical plane with the middle wire of the three phase lines.

Telephones which often call on the line use a special circuit. A button key is mounted at each instrument and so connected that, when in its normal position, ringing signals only the other stations on the line. Depressing it closes a circuit to ground. This grounds one side of the generator, and from the ungrounded pole ringing current passes through one-half of a repeating coil, and a 1,000 ohm grounded drop at the exchange. Connecting the grounded drop circuit at the middle point of the repeating coil preserves the balance of the line. The telephones at the power substations are enabled through this circuit arrangement to call either the switchboard in the power house or the main exchange. All the power substations have direct wires to the local telephone exchanges besides the circuits to the power house, so that in case of trouble the failure of their own system will not prevent communication being established with the power house over another route.

The electrical portion of the road is fifty miles in length and operates on three divisions. The power, furnished at a pressure of 12,000 volts, is received from a central station at five substations, where it is changed into direct current at a pressure of 600 volts, by means of rotary transformers. Feed wires connect the substations with the third rails. As the electrified divisions constitute the main routes of travel between Brooklyn and the suburban districts, any interruption to the traffic would greatly inconvenience a large number of persons. The company, therefore, has instituted a patrol system, employing 12 men, especially for this purpose. Each man covers his route once in two hours and is expected to notify the power house of any defects he may observe. To enable this to be done quickly a telephone circuit for each of the divisions follows the routes of the high tension lines and connects with the main exchange. At intervals of 2,000 feet a telephone is connected to these circuits, so that no point on the line is more than a thousand feet from a communicating station. The telephones are desk instruments, contained within a weatherproof box made of double thicknesses of wood with separately hinged inner and outer doors. A padlock is provided for the outer door, the lock being so designed that the key cannot be withdrawn until it is locked. The interior portion of the box is divided into two compartments, one holding the dry cells and the other the telephone apparatus. Mounted on one side, near the door, is a double pole knife switch, so arranged that when it is closed its handle prevents the closure of the inner door. The switch is used to open the circuit of the telephone when not in use. If this were not done, as there are from 20 to 30 telephones on a line, the bells bridged across would cause so heavy a shunt that calling the exchange from the stations would be uncertain.

A particular instance, showing the use of this system, may be of interest. When a patrolman notices any trouble with the power circuit he immediately goes to the nearest telephone and calls the power house, notifying the attendant there of the trouble and its location. The operator then calls the emergency crew who go out on a special automobile car to the point in trouble. Upon arrival the foreman calls the power house, and instructs the person in charge to open the circuits in trouble, at the same time, giving his name and receiving the name of the operator. As soon as the circuit is opened he receives by telephone an O. K. to go ahead. Before touching the power wires they are all connected to earth separately through a ground wire to take off the static charge, and then the repairs are made. When everything is in order the foreman again calls the power house, notifies the

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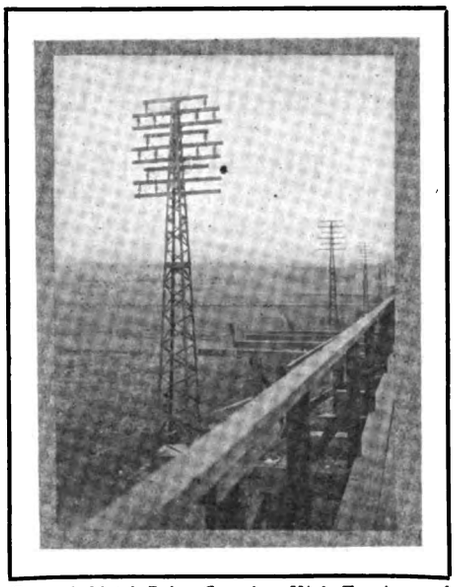
operator that the lines are clear, and the current is turned on. For this service there are at present 124 telephone stations, but the number will be increased as the work of electrification is continued.

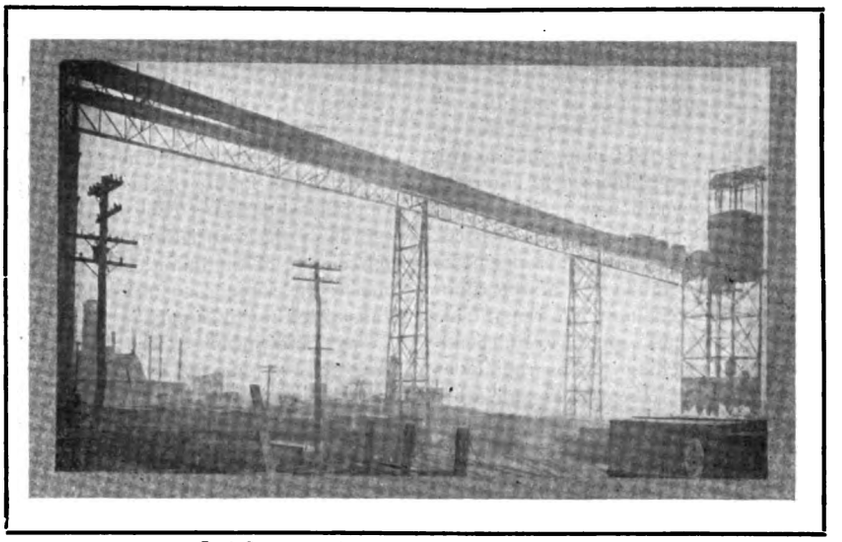
In conjunction with the telephone in the signal towers a special circuit arrangement is employed. Instead of having a telephone for each of the lines that enter the tower, a single desk instrument is used. Each line has its own bell and is connected to the contacts of a double pole switch. The switch blades connect with the telephone. When an operator receives a call he at once throws the connecting switch, which puts his instrument into circuit.

Whenever a section of the railroad is being repaired a temporary telephone line is built, which connects the two flagmen at each end. As the progress of repairs continues the line is moved along. This is a preventative measure to minimize the possibility of accident. It is interesting to note that telephones are employed wherever there is any possibility of their being of any assistance in the performance of all kinds of work. In this way the highest efficiency of the system of communication is secured.

The entire plant was built by the railroad company and is maintained by it under the supervision of the electrical superintendent, Mr. L. S. Wells, who has charge of the entire electrical equipment of the system. The maintenance of the telephone system is in direct charge of the chief inspector, Mr. A. L. Branning. A construction crew of six men is at present employed making additions to the lines and extending the system. Five combination men are used to clear trouble, and a corps of twelve operators is needed to furnish service for all the exchanges. An operator is in attendance at each switchboard at all times of the day and night.

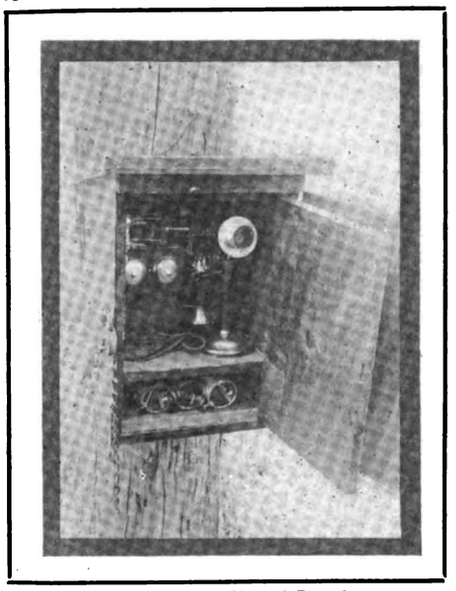


Trussed Metal Poles Carrying High Tension and Telephone Wires.



Coal Conveyor, Operated by Telephoned Directions.

This system provides for all the general features secured by a branch exchange. Connections between offices and all desired points of the system are secured over the special lines operated by the company, and business with outside points is carried on over the lines to exchanges of the telephone companies in New York and in Long Island City. But the most novel and most important feature of this comprehensive system is that its use furnishes a most satisfactory demonstration of the efficiency of the telephone as an aid to the maintenance of an extensive railroad system. By its use the public is so safeguarded that the danger of interruption of traffic is reduced to a minimum. Transmission from any point of the patrol system is remarkably clear and distinct, notwithstanding the fact that the circuits are within 10 feet of the three phase high tension lines throughout almost the entire length of the routes.



Instrument for Use of Patrol.

The use of large size conductors is worthy of consideration. Aside from their lower resistance, they possess the advantage of increased tensile strength. To the weight of the bare wire must be added the weight of the insulation, and in winter possible accumulations of snow or sleet. While a smaller gauged conductor might be able to withstand the strain, yet, when a breakage must not occur under any conditions which could be foreseen, it will be apparent that No. 10 is none too small. As the power system extends the length of the telephone system will increase, hence the need for large sized cable conductors which reach the unusual size of No. 13 B & S. It will be apparent from the consideration of these facts that the telephone system herewith described, although unique in many respects, is representative of the most advanced engineering ideas associated with the perfect transmission of speech by wire. It may, therefore, be taken as an illustration of a system which well fulfills the requirements of the extraordinary conditions which it was designed to meet. Insulated lines are often used for short distances, but for a plant to have all its aerial wires of large size and so protected is a new idea inspired by the necessity of avoiding all possibility of crosses between parallel telephone wires as well as between these wires and telegraph or other foreign circuits. The excellency of the construction, and the extreme care exercised to prevent breakdowns or interruptions to the service are the features which will undoubtedly mark this plant as a model not only for similar systems on railways, but for all work where special conditions require unusual reliability.

In this particular instance the telephone is more than a simple means of communication. It is a most important part of the operating equipment of the road, and might truly be likened to a nerve system, controlling the various functions more directly involved in the operation of the plant. In the control of trains and the inspection and maintenance of the power system much depends upon the reliability of the telephone. If it fails, the organization is materially handicapped. It is for this reason that no effort has been spared to make the system as nearly perfect as skill and intelligence will permit.

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Report of Meeting of the Executive Council and Committee on Litigation and Legislation of the National-Interstate Telephone Association

AT the meeting of the Executive Council of the National Interstate Telephone Association, held in Cleveland, Ohio, November 24, the following gentlemen were in attendance: James B. Hoge, president, Cleveland, Ohio; Theodore Gary, first vice-president, Macon, Mo.; Colonel J. D. Powers, Louisville, Ky.; Ed. L. Barber, Wauseon, Ohio; Chas. C. Deering, Boone, Iowa; George W. Beers, Fort Wayne, Ind. Mr. Jas. G. Splane, treasurer of the association, was also present. Letters were received from Mr. John Van Liew, second vice-president, Los Angeles, Cal.; Mr. Richard Valentine, Janesville, Wis.; Mr. C. E. Wilson, Philadelphia, Pa., and from Mr. A. L. Tetu, secretary of the association, Nashville, Tenn., regretting their ability to attend. Mr. Hoge presided at this meeting; Mr. J. A. Harney, assistant secretary of the association, acted as secretary.

A brief review was taken by the members of the council of the work accomplished by the association, and the Independent interests of the various States since the June convention. Reports were presented showing that associations have been formed and others were at present under way in a number of States that until this year had never realized the importance or necessity of organization. Several States have changed from former plan of organization to the National-Interstate district plan, finding this much more effective. New capital has been induced to enter the telephone field, and is being used to develop new territory, and make necessary changes and extensions in the crowded districts. Franchises have been or are being secured, and arrangements made to build practically all of the important cities of the country at present having no Independent exchanges. A remarkable growth is apparent in the long distance lines especially, Independent companies in the various States reaching out as rapidly as possible to close up existing gaps between themselves and other Independent companies. The various State associations are in a very healthy condition, and are constantly increasing their membership. On the whole, the general outlook was never more encouraging than at present.

The council members expressed themselves as being well satisfied with the progress made by the association in its efforts to secure more perfect organizations in the various States, and also of the work accomplished by the draughting and supply departments since these were established. They considered the supply department as the best possible means of thoroughly introducing the standard toll sign and "official shield" in its various forms, and recommend that this department be given the hearty support of the Independent people. They also urge that all companies operating toll lines furnish the necessary data to the draughting department for the State maps, which the association is preparing, and call the attention of all Independent interests to the great value of these maps.

The following permanent committees were decided upon: Standard forms of accounting, five members; standardization of equipment, five members; standard operating rules and regulations, three members.

Qualifications of a number of probable candidates for these committees were then discussed and taken under advisement. The names of the committees will be announced in the next bulletin.

A number of invitations from various cities desiring the next convention were read and discussed. St. Louis was selected as the site for this convention, which will be held some time in June, 1906. To the president was left the matter of arranging the necessary details. The exact date, etc., will be announced in the next bulletin.

Resolutions were adopted tendering the Independent telephone journals a vote of thanks for courtesies extended by them to the association since its organization. Copies of such resolutions were forwarded to the various journals.

The following brief memorial, prepared by the committee appointed for that purpose, was then presented by Mr. Barber, chairman of the committee, and unanimously adopted:

"William D. Barnard, an honored member of this association, and one of its executive council, died on the 16th day of October, 1905, in the prime of life and in the midst of his usefulness. During the brief time he had been connected with this association officially, owing to his illness (which proved to be his last) he had not been permitted to take active part in its deliberations and work. His willingness, however, and his readiness to assist was always manifest and pronounced.

He was a persistent worker and the expansion of the business and development of the United Telephone & Telegraph Company, of which he was vice-president, was in no small measure due to his tireless efforts and his faith in the Independent movement. In the death of Mr. Barnard the Independent telephone movement has lost one of its most loyal and tireless adherents, the United Telephone & Telegraph Company a zealous and able officer, and this association a loyal friend and wise counsellor; therefore be it

Resolved, That the members of this association by this means extend to the family of the deceased their sincere condolence and sympathy and that a copy of this resolution be spread upon the records of the association to stand as a feeble expression of our appreciation of the qualities of mind and heart of the deceased as long as the association may continue, and a copy of the same be transmitted to his family."

Ways and means were considered for raising the necessary funds to continue the work of the association, and a committee was appointed to carry out the details of plans adopted.

At the meeting of the Committee on Litigation and Legislation, the following gentlemen were present: Dwight E. Sapp, Mount Vernon, Ohio; Breckinridge Jones, St. Louis, Mo.; J. B. Ware, Grand Rapids, Mich.; Edward E. Clement, Washington, D. C. A letter was received from Mr. O. F. Berry, Carthage, Ill., stating that a very urgent matter coming up quite unexpectedly prevented his attendance. Mr. Sapp presided at this meeting, Mr. Clement acting as secretary. The following recommendations in regard to territorial disputes between companies were presented by this committee to the executive council, and adopted unanimously by that body. The executive council also instructed the secretary to send copies to the secretary and president of the various State associations:

It is recommended:

(A) That disputes between companies of the same State should be settled by an arbitration committee appointed according to rules adopted by the State association; such rules to be of a character which will enable either party to a dispute on his own initiative to invoke the action of an arbitration tribunal.

Appeal from the decision of any State arbitration tribunal to the National Interstate Association should be filed with the secretary of the State association within thirty days of the decision and should be allowed only upon an affirmative majority vote of the executive committee of the State association properly certified by the president or secretary thereof.

After such approval, all the papers should be promptly transmitted by the secretary of the State association to the president of the National-Interstate Association and thereupon the executive council thereof acting in conjunction with the Committee on Litigation and Legislation, should decide whether or not the appeal shall be entertained, and in case of an affirmative majority vote, should proceed to appoint an arbitration committee to hear and decide the questions involved.

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Such decision should be final and binding in all cases, due notice having been given all parties of the hearing, and should be certified by the president of the National-Interstate Association to the State association from which the appeal is taken for action in accordance therewith.

(B) Regarding disputes between companies in different States.

Complaints should be made to the respective State associations, and in each case the respective executive committees of the States concerned should each designate an arbitrator, and the two so designated should select a third, these three to constitute a tribunal to hear and determine the matters in dispute, certifying their decision to the presidents of the State association. Appeal from such decision should be taken through either of the State associations involved in the manner, and subject to the conditions, hereinbefore suggested.

A number of other matters were taken up by the Committee on Litigation and Legislation, but no definite action taken at this time. The meeting of the Executive Council and Committee on Litigation extended well into the evening.

OFFICIAL BULLETIN NUMBER SIX OF THE NATIONAL-INTERSTATE TELEPHONE ASSOCIATION.

We must again call the attention of the Independent people to the necessity of giving us their co-operation in compiling our State maps. While the work so far accomplished is encouraging, much greater progress could have been made if our requests for data were responded to more promptly. This is a matter in which every Independent company is interested. If you have not already done so, send us at once some sort of a map of your lines. If necessary, we can take up the matter of details with you later. Maps for the following States are at present being prepared, and will be finished as rapidly as complete data can be secured:

Ohio, Indiana, Michigan, Pennsylvania, Missouri and Illinois.

We have considerable data for nineteen other States. Maps for some of these will be commenced during the coming month.

Now, gentlemen, please get busy, and SEND US THAT MAP OF YOUR LINES.

SUPPLY DEPARTMENT:

The "Official Shield" lapel buttons, clasp and hat pins are proving very popular. Several thousand have been sold to date to Independent people in all parts of the country, and we are in receipt of many favorable comments from those receiving the emblems. If you have not seen samples, we shall be glad to send same on receipt of price, 35c. each.

The demand continues for the standard toll sign, "Official Shield" directory covers, stationery, etc., handled by this Department. To date we have shipped these supplies to Independent companies in over thirty States, which indicates that the "Official Shield" is being extensively advertised. Are you educating your patrons to "LOOK FOR THE SHIELD" when they want good telephone service? Catalogue sent on request if you have not received a copy.

EXECUTIVE COUNCIL, COMMITTEE ON LITIGATION AND LEGISLATION:

Report of the meeting held by these two bodies at Cleveland, Ohio, on Nov. 24, accompanies this bulletin. Particular attention is called to the recommendations in regard to territorial disputes between Independent companies.

WARNING TO INDEPENDENT EXCHANGE OWNERS:

Give no option on your plant to any individual, firm or corporation until absolutely sure that such option is not being secured by agents of parties unfriendly to Independent interests. It has been a common practice of these parties in the past to secure such options for the purpose of using them to intimidate smaller companies in the vicinity of the exchange on which options had been secured; the object being, if possible, to induce such smaller companies to sever their Independent connections. It has usually been found upon investigation that the parties securing these options had no intention whatever of purchasing the plants on which they were given.

TELEPHONE ENGINEERING INSTRUCTION AT PURDUE UNIVERSITY.

TELEPHONE engineering at Purdue is taught by example and laboratory practice. In the class room the fundamental principles are taught and explained by concrete examples. Methods of doing things are made the subject of study and every effort is made to get a clear view of the "why" and "how." In the laboratory, parts of telephone apparatus are assembled to illustrate each particular circuit under study. The students must not only wire up the circuit, but make it work and give a clear explanation of its action. In the senior year investigation is made along advanced lines of work. The Rowland electro dynamometer plays an important part, as it enables some very valuable measurements to be made directly.

The telephone students of Purdue University are an energetic lot of fellows. Twelve of them have recently joined the A. I. E. E. as student members, and have formed a separate section for the discussion of the telephone. In the meetings of this section all kinds of questions relating to the telephone, the telegraph, the wireless telegraph and all similar devices will be asked and talked over. A special feature will be the informality of the programme, the effort being to induce all to take part by giving information, telling experiences of practical work or asking questions.

These students have also started a movement to petition the A. I. E. E. for the design of a badge to be worn by student members of the Institute.

INDEPENDENT COMPANY IN SIOUX CITY OPENS UP FOR TOLL BUSINESS.

CONNECTION between the Independent Company at Sioux City, Ia., and Mineola, Treynor and Macedonia has been established by means of temporary equipment in Sioux City. Public pay stations for toll line service are being installed in different parts of the city, and new lines are being completed, which will place the Sioux City Company in direct connection with all the adjacent Independent systems. The matter of working up the local exchange will be taken up at once.

Evidence of the Bell feeling in respect to prospective competition is being made manifest. It has a number of solicitors at work endeavoring to close yearly contracts at a reduction of 50 cents a month from the present rates, but the public in general is withholding its support till the Independent system shall be completed. It is confidently expected that the results of Independent competition will be the same here as at other points throughout the State of Iowa, where it has secured fully nine-tenths of the local business and practically all the toll and long distance.

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The Development of the Telephone Cable*

By Thomas Stanley.

As a result of this change the cables were not made continuous, but were constructed in lengths to reach from manhole to manhole (Fig. 8), and after being pulled in the sections were joined at their adjacent ends. With the cotton insulated, resin filled cables, these joints were made by removing the lead sheaths at the adjoining ends for a space of about 6 inches, in order to expose the conductors, and

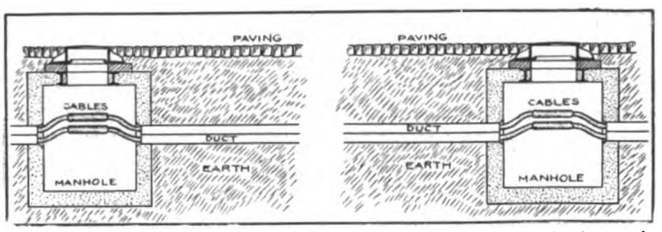

Fig. 8. Longitudinal section under pavement, showing method of carrying lengths of cables through ducts, and joining at manholes.

joining the conductors in the usual manner, using cotton sleeves to cover the bare joints. Resin oil was then poured over the jointed conductors, the lead sleeve moved into place, and the sheath made continuous by the use of wiped joints.

Three considerations were important in leading to the replacing of this type of cable with one of a more advanced construction. First, to work the ducts at a higher efficiency it was necessary to increase the number of conductors that could be drawn through each. Second, to increase the efficiency of transmission, particularly on long distance connections, it was necessary to decrease the capacity of the cable. Third, it was necessary to devise some substance to be used as "filling" other than the resin oil, on acount of its cost and peculiar difficulty of handling at the splices. After considerable experimentation it was decided to use manila paper in place of cotton, and to saturate the cable with paraffine instead of the resin oil. It was at this time that the idea of using reversed layers was hit upon. The new cable was constructed as follows: The jute core was removed as useless, and the pairs, each conductor of which was wrapped with the paper insulation, were laid around a central one in reversed layers. The cable was then bound loosely with cotton thread, and immersed in a long tank of paraffine. When thus thoroughly boiled out the cable was removed from the tank and securely bound with two layers of cotton thread, which had previously been boiled in paraffine. It was then passed through the machine and the lead sheath put on. In Fig. 9 is shown a cable loosely bound together, and the insulation on one of the conductors unraveled to show the breadth of the ribbon.

The advantages gained by this form of construction were as

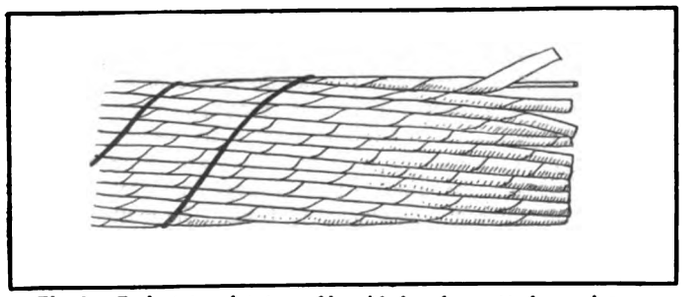

Fig. 8. Early type of paper cable with loosely wrapped covering.

follows: First, as to reduction of size, a 50 pair cable of this type had a diameter of 1½ inches, against 2½ inches for the cotton insulated cables, and it was found possible to construct a cable of 100 pairs having a diameter of approximately 2 inches. Thus, double the number of pairs could be accommodated in one duct. Again the capacity between any one conductor and all others grounded on the sheath, was reduced from .215 m. f. per mile for the cotton insulated cables to .175 m. f. per mile for the paper insulated, paraffine saturated cable; a diminution of about 19 per cent. To distinguish each conductor from its mate, one conductor of each pair was covered with red paper, while the mates were covered with white.

On or about this time a cable was constructed by the Felton-Guilleaume Company, in which the two conductors of a pair were placed on opposite sides of a ribbon of paper, and twisted together. The two were then encased in a second wrapping of paper. This cable is shown in cross-section in Fig. 9, and the method of wrapping is also shown in the same figure. It is claimed that saturated core cables of this type have a capacity as low as .170 m. f., as against .175 m. f. for the other type.

The use of paper as an insulating medium reduces the mutual capacity in two ways. First, paper has a lower specific inductive capacity than cotton, and paraffine a lower specific capacity than resin oil. Second, when paper saturated insulation is used, carbonic acid gas finds its way into the cable, and this gas also has a low specific inductive capacity. Third, porous paper entraps into its meshes a quantity of dry air which has the lowest specific inductive capacity of any known substance, and this dry air is not driven out by the melted paraffine. As may be surmised, the

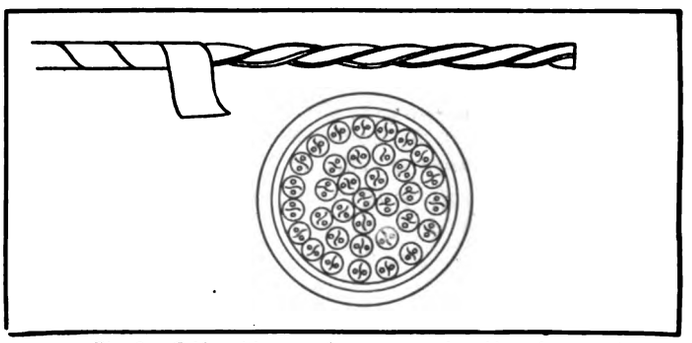

Fig. 8. Cable with two wires on opposite sides of paper.

paraffine saturation was intended to prevent moisture from entering the cable with consequent damage to insulation.

It had long been recognized that if the interstices of the cable were filled with dry air only, the result would be a still lower capacity. Finally, a bold stroke was determined upon, and a dry core cable constructed in the same manner as that employed with the saturated core. It was not immersed in paraffine, except at the ends to prevent the entrance of moisture, when the sheath was removed for splicing. It was found that the capacity was reduced from .175 m. f. to .080 m. f. for the dry core cable. Another advantage gained lay in the reduction of the diameter from 2 inches for a 100 pair saturated core cable to 1 15-16 inches for a 100 pair dry core cable.

The use of the dry core cable was in the beginning considered a hazardous proceeding, and it was employed only for underground work. Fear of the absorption of moisture, by capillary attraction, was entertained by some engineers. Experience, however, has shown that the extent to which this action takes place, in case of exposure of the cable ends to moist air, is much smaller than was anticipated.

The efficiency of dry air and carbonic acid gas in reducing static capacity is very well known. In Europe elaborate devices are employed to maintain a circulation of either the one or the other throughout the cable.

When the metallic sheath was first used it was made wholly

(*Continued on page 452.*)

*Continued from the issue of December 23d.

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QUERIES

BUSY TEST ON MAGNETO SWITCHBOARD.—(640.)

We have a three operators' position, 480 line, magneto call switchboard, wired and arranged according to enclosed diagrams. Operators Nos. 1 and 3 frequently cut out each other's connections. Can a busy test be arranged?
H. S.

There is only one safe way of providing a good busy test for the type of circuit you now have in your switchboard, and that is along the lines shown in the accompanying illustrations:

Fig. 640*b*, parts *A* and *B*, show your present line circuit arranged for full metallic and common return operating. The former in order to be adapted to busy test conditions must be clear normally from all common connections to other lines or apparatus in your switchboard as well as on the outside of the exchange. This is easily accomplished if not already the condition. The common return lines must, however, be provided each with a 600 ohm non-inductive resistance *LR* between the sleeve connection of the jacks and the common return, as shown in Fig. 640*a*, C. The use of this resistance is explained in connection with Fig. 640*c*.

Your present cord circuit is shown at *A* in Fig. 640*a*, but in order to have busy test properties it must be changed as shown in part B, Fig. 640*a*. The clearing out drop *C. O. D.* of each cord circuit must be located on the answering half so as to leave the tip calling strand of the cord free. Also, a common battery of about six volts (four dry cells connected in series will do),

Fig. 640*c* illustrates the operation of these modified circuits. An answering cord, No. 1, is shown connected to the end jack of a common return line while the calling cord of cord circuit No. 2 is in the act of testing for "busy."

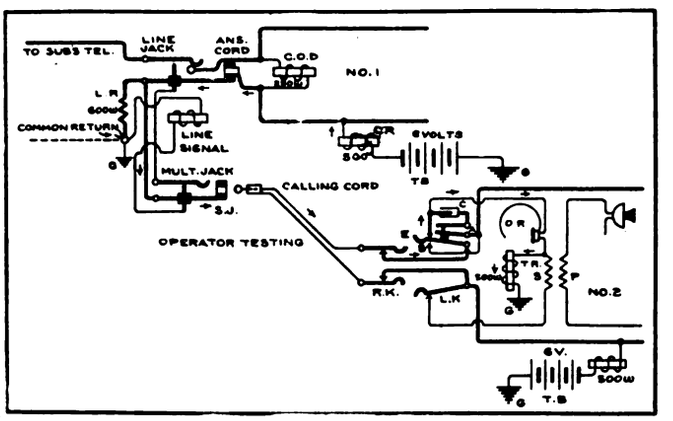

Fig. 640c.

Consider first the line circuits shown in Fig. 640*b*, parts A and C. Here the sleeves of the jacks *SJ* are at ground potential, or in other words no current will flow if a connection is made from

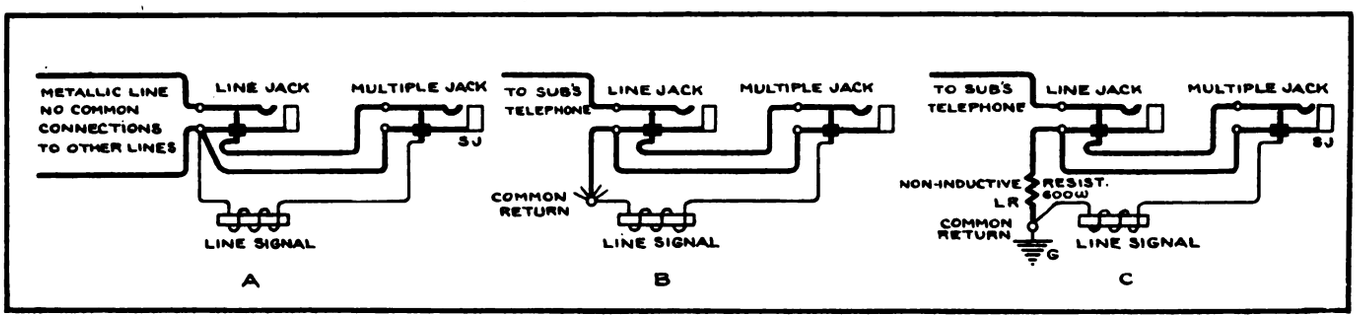

Fig. 640b.

must be connected to the sleeve strand of each cord circuit through individual 500 ohm retardation coils, *CR*. The ground side *G* of this battery must be connected to the common return of the line circuits as well as to all other parts marked *G*. The listening keys of each cord circuit must be provided with extra

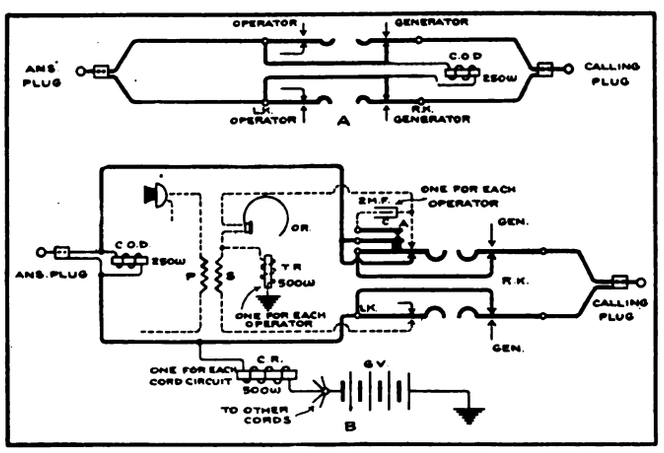

Fig. 640a.

pairs of contact springs *A*, while each operator's set, shown in dotted lines, must have a 2 M. F. condenser *C* and a 500 ohm retardation coil *TR*.

them to ground. Now if the tip of the calling plug of cord circuit No. 2, Fig. 640*c*, was touched to the sleeve *SJ*, Fig. 640*b*, A or B, a circuit would be established through the tip strand of the calling cord, upper lever *E* of the listening key *LK*, through operator's head telephone *OR*, and thence through the 500 ohm retardation coil *TR* to ground *G*. As no potential exists on jack sleeve *SJ*, there will be no flow of current through the circuit, so that the operator will hear nothing, the indication of a non-busy line.

The use of the common battery *TB*, connected to the sleeves of the cord circuits, is now apparent, as it puts an electrical potential on the sleeves of all of the jacks common to any line, into which it is connected. Now with the plug of the cord circuit No. 1, Fig. 640*c*, inserted into the line jack a difference of electrical potential exists between the sleeve of all multiple jacks of this line as at *SJ* and ground. This is made possible on a common return line by the presence of the 600 ohm non-induction resistance *LR* which individualizes the sleeves of these lines from the common return, otherwise no test individual to a line could be had as it would be impossible to raise the sleeves of the jacks to a potential owing to the low resistance to ground. When the tip of the calling plug of cord circuit No. 2 is touched on the sleeve *SJ* of the multiple jack, a circuit is established, as shown by the arrows, from test battery *TB*, through the 500 ohm retardation coil *CR*, sleeve of cord circuit, sleeve of line jack, sleeve of multiple jack

(*Continued on page 452.*)

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THE EDITOR'S PAGE

THE CHICAGO ELECTRICAL SHOW.

AT the coming electrical show in Chicago especial attention is to be devoted to matters of broad interest to telephone men. The leading manufacturers of telephones and of various kinds of equipment for telephone plants are to have large and carefully prepared exhibits. It is expected that this will be the greatest exhibition of telephone apparatus which has ever been collected for the information of the public.

This offers an important demonstration of the high place which has been attained by telephony as one of the leading great industries of the country. A few years ago an electrical show had comparatively nothing to draw upon in the telephone field. Now, however, conditions are so changed that we find the telephone manufacturers prepared to take a part which shows that they have earned a place as leaders in electrical industry. Their exhibits will show that their designers have effectively grasped and embodied the most advanced statements of electrical theory. Their mechanical features will perhaps convey a more adequate idea of the efficiency of modern shop practice than those of any other line of work represented.

To the operating man especially such a show as this offers most valuable opportunities for the gathering of information. Every man has certain requirements which seem to be imperfectly fulfilled by apparatus with which he is familiar. As a basis for the consideration of new forms printed matter is often far less satisfactory than a personal examination. An opportunity to look over a line of appliances which substantially covers the whole field of telephone work will often lead to the discovery and selection of the thing exactly suited to a particular need. There are, moreover, in use at the present time many pieces of equipment which are of old and comparatively crude design. The necessity for replacing material of this sort at the earliest date warranted by the financial condition of the plant is recognized by every manager. The question of the proper apparatus to use, however, is one which it is far from easy to decide. Even though fairly complete information is obtainable, it is rare that a manager cares to give as much weight to a report as he feels is due to the judgment of his senses, when he has an opportunity for direct observation and the comparison within the space of a few minutes of all the leading types of apparatus sold by our manufacturers. Such a comparison will go far toward bringing about a correct selection of standards.

This matter of standardization of apparatus is one of the most serious problems which to-day confronts the manufacturers and operators who are developing the Independent field. Upon its correct solution, inasmuch as a large proportion of every telephone investment is laid out on equipment, depends the future prosperity of every plant, in so far as this is influenced by the permanence of the property in which the money is placed. This will be notably evident when it is considered how far out of date in design and construction are many portions of telephone plants which only a few years ago were thought to embody the most advanced ideas. The necessity for replacing this apparatus at the present time corresponds to the need which will cause the destruction a few years from now of instruments which, while retaining much of their original mechanical and electrical efficiency, will have been found to depart widely from the general trend of development. It is therefore important that each man who will have to do with such apparatus should gather, as well as is possible, a clear idea of the direction to be taken in the future progress of the art. From a business standpoint, it pays to embrace such an opportunity for gathering specific and valuable information at small expense as will be presented by this exposition.

THE INDEPENDENT BADGE.

THE emblems which are being distributed by the National-Interstate Telephone Association offer an extremely attractive method of keeping before the public the significance of the Independent telephone movement. It is important that each of the companies which are competing with the Bell interests should make its subscribers thoroughly aware of the fact that the Independent companies are associating themselves into a large and coherent organization. In this way the Bell argument that it is the only telephone company to furnish long distance service, which has been pushed so far in the effort to create a favorable public impression, will lose all its force. The public will realize that through the close association of the companies operating only their own lines with their neighbors on all sides, a service is furnished which will give satisfactory results on a connection of any reasonable length. It will be made apparent that each of the Independent companies is in possession of definite means for obtaining information which will enable it to co-operate with all its associates in the upbuilding of an extensive and effective telephone system.

The fact that the public is in sympathy with the aims of the local Independent company will lead to a desire to do long distance business over the lines of its associates rather than to patronize its rival, with substantial benefit to all the associated companies. Furthermore the importance of the Independent telephone interests is such that the press of the country is filled with the notices of the extensive and meritorious service offered by these companies. By widely advertising its connection with the general movement, each company will feel the benefit which comes from the advertising value of such notices, even though many of the items may refer to systems in remote parts of the country. This will be a means of strengthening the popular support which is always rendered a fairly conducted movement which is known to be large and assured of success.

There are numerous other substantial benefits which are known to accrue to those companies which advertise widely their connection with the general work carried on by the associated Independent companies. It is a valuable method of creating confidence in the purposes of each concern. It follows that any legitimate means for calling attention to this work of co-operation is a profitable thing. It is a definite factor contributing to the extension of the plant and the production of dividends. We therefore wish to urge the general adoption of the badge by all Independent companies. Its cost is small, and the expense to a company of furnishing one to each of its inspectors, to be worn on his visits to subscribers' stations, would be inconsiderable as compared to its advertising value.

In addition to its effect on the public the wearing of an emblem of attractive design, which has behind it such a broad significance as the badge of the Independent telephone service, should create a valuable *esprit de corps*. Every worker should wear one, as a means of declaring his loyalty to the great Independent movement. Its owner may well feel proud of his association with such an agent of progress. So, Independent telephone men, join the movement; declare your allegiance; wear the emblem!

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THE TELEPHONE IN THE COURTS

CONDUCTED BY A. H. McMILLAN.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

A FRAUDULENT SCHEME OF ORGANIZATION.

The scheme of organization of a telephone company in which the writer took stock provides that no general election of directors shall be had until one hundred miles of wire shall be equipped. This is in a rural telephone district, and it will be some time before the necessary length of wire will be in place. What are my rights as a stockholder in the company?

A SCHEME of organization similar to the one you mentioned has been held fraudulent because it puts it beyond the power of the subscribers to the stock to exercise any power of control over the principal expenditure that the company is going to make. You can stop further proceedings by an injunction if you wish. See Terwilliger vs. Great Western Telegraph Company, 59 Ill. 249.

EFFECT OF PUBLIC FRANCHISE ON SUIT FOR DAMAGES FOR ERECTION OF POLES.

Can a taxpayer of the city enjoin us from erecting poles when we are authorized by a statute of the State and an ordinance passed by the city council to place our poles in a certain street? The taxpayer has no property that will be injuriously affected in the least degree by our line of poles.

UNDER the circumstances you state, the taxpayer has no cause to complain, because he has not suffered any special damage by the erection of your line of poles. By suffering special damage we mean that he has no property that has been injuriously affected in any way. Hence, he is in no position to enjoin any of the operations of your company.

OKLAHOMA CITY RATE CASE.

THE case of Oklahoma City vs. The Pioneer Telephone and Telegraph Company has been appealed to the Supreme Court of Oklahoma. The plaintiff is seeking an injunction against the company to prevent it from raising its rates. The injunction was granted by Probate Judge Harper of Oklahoma City, but when an appeal was taken to the District Court the injunction was denied. The trouble at Oklahoma City began when the Pioneer company made an agreement with the Missouri & Kansas Telephone Company whereby the Pioneer people abandoned their exchanges in Kansas and the Missouri & Kansas Company retired from Oklahoma towns. When left without competition a readjustment of rates was made by the Pioneer company and the Oklahoma City people rebelled.

JURISDICTION OF PROBATE COURTS OVER TELEPHONE MATTERS IN OHIO.

THE Supreme Court of Ohio has decided adversely to the Queen City Telephone Company in its suit to get a Cincinnati franchise. The company commenced an action in the Probate Court after its organization to find a method of constructing its lines after the city council had adopted the report of the Committee on Telephone and Telegraphs, which was to the effect that there was not room in the streets for the accommodation of the lines asked for and that it was inexpedient to make any grant or agreement. The Probate Court on considering the application of the company laid out specifically the mode or manner in which the telephone company should proceed, covering such points as the kind of poles to be used, the line of construction, the bond required and numerous specifications. All this was done after a hearing, and the decision of the court was appealed to the Court of Common Pleas and there reversed. In the Circuit Court the decision of the next lower court was affirmed, in that the plaintiff, the Queen City Telephone Company, was not properly organized and had no standing in any condemnation proceedings, but a majority of the court differed from the second proposition, which was: "That the court had no power to grant the right to go underground in subways," which would have been the exercise of legislative power. On this proposition the Supreme Court held that the statutes of Ohio do not confer power on the Probate Court to grant to a telephone company the right to put its wires and apparatus in conduits under the streets of a city in the absence of consent by municipal authorities. The court further decided that a petition in such case which shows no specific questions of difference between the corporation and the municipality authorities, but alleges only in that behalf that they have failed to agree on the mode of use of the streets, and prays for a general judgment directing in what mode the plaintiff may construct its telephone lines along the streets, does not state facts justifying any order or judgment in its favor. Case to be reported.

CITY CANNOT CHARGE A RENTAL FEE FOR POLES IN TENNESSEE.

THE city of Memphis brought suit against the Postal Telegraph Cable Company to recover $1,772 on account of rents alleged to be due by the company for the occupancy of the streets of the city by the company's telegraph poles, or in case a decree for that sum would not be proper, that the right of the company in the streets of the city should be declared forfeited. The United States Circuit Court held that the streets and alleys of the city of Memphis were public property over which the State of Tennessee has the right of absolute control and with respect to which the city can exercise only such powers as have been granted by the Legislature, which are limited generally by its charter to the enactment of ordinances not in conflict with the general laws. By acts 1885, page 120, C. 66, the Legislature of Tennessee granted telegraph companies the right to construct, operate and maintain their lines upon the public highways of the streets of the towns and cities of the State, in consideration of the immediate dispatch of official messages. This being so the court held that the city of Memphis had no power under its charter to require a company which had constructed its lines in the streets of the city under such statute to pay a tax or rental on its poles for the use of such streets, and an ordinance imposing such tax or rental is in violation of the statute and void. The suit of the city of Memphis was therefore dismissed.

City of Memphis vs. Postal Telegraph Cable Company, 139 Fed. 707.

TELEPHONE CONVERSATIONS AS ADMISSIONS IN EVIDENCE.

A TELEPHONE conversation is inadmissible to establish admissions of one of the parties, where it appears that the witness was not acquainted with the party's voice, and could not identfy it. Such a case is not controlled by the cases which relate to communications by telephone from an office in response to communications or inquiries, and to the presumption which arises from the transaction of business by telephone from the place of business of the person in whose control the telephone is. Swing vs. Walker, 27 Pa. Super. Ct. 366.

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IN THE OPERATING FIELD

INDEPENDENT COMPANY IN BIRMINGHAM, ALA., HAS NEARLY COMPLETED REPAIRS ON ITS PLANT.

THE People's Home Telephone Company has addressed the following circular letter to its subscribers relative to the installation of its new switchboard to replace the one destroyed by fire:

"The repairs on our building have now gotten to the point where we can rest assured that we can commence putting in our switchboard apparatus this week. Most of the material is now in Birmingham, heavy shipments having come by express last week, and stored until the building was in shape to receive it, so that we will resume business sooner than we at first thought possible.

"As announced in the daily papers, the factory has sent us one of its latest improved switchboards, which was originally intended for another city, and we are assured by the contractors and the switchboard factory, who will install the switchboard for us, that we will be in operation not later than the 10th of next month, and possibly sooner.

"Our subscribers can rest assured we are sparing neither time nor money in order to get in shape as soon as possible.

"We take this opportunity to thank our many friends for their kind expressions of sympathy, and to assure them that we sincerely appreciate same. We will soon be in shape again to give as good or better service than before. We will have the latest improvement in apparatus, and all of our old operators will be ready for work again as soon as we need them."

This is most welcome news to the many Independent officials who have regretted the loss caused by the recent disaster wrought by fire in the exchange of the People's Company.

NEW ISSUE OF STOCK BY OHIO INDEPENDENT COMPANY.

BROKERS in Columbus, O., are offering $50,000 worth of preferred stock of the Newark, O., Telephone Company at par. This is the Independent company of that city. Its preferred stock pays 6 per cent dividends and the common 8 per cent. The company was organized in 1894 and incorporated under West Virginia laws with a capital of $20,000. This was increased in a short while to $100,000, of which $60,000 was issued as common and $40,000 as preferred stock. Still later an issue of preferred stock was made to the amount of $50,000, now offered. The company has but $35,000 bonded indebtedness.

The last report of the officers of the company is as follows: Earnings from rentals for the present year, $32,683; from tolls, $7,142; total gross, $39,825. Operating expenses, $5,576; maintenance, $5,903; general, $9,325; total, $20,804; net, $19,020. Interest on bonds, $2,250; dividends on preferred stock, $1,659; other interest, $725; surplus for common stock of which there is $40,000, $14,395. The new issue will require $3,000 for dividends.

LONG DISTANCE COMPANY IN NORTH CAROLINA OVERCOMES BELL OPPOSITION.

FOR several weeks the North State Telephone Company of High Point, N. C., has been trying to get a franchise to do a long distance telephone business in Greensboro, thereby connecting the city with its twelve hundred stations in the large lumber, cotton mill and agricultural sections of Davie, Davidson, Randolph, Moore, Montgomery and other counties. These counties now have no telephone connection with Greensboro.

The Southern Bell Company made a heavy fight to keep the North State Company from getting its franchise for long distance service. The matter was fought to a finish before the board of aldermen and the franchise was granted by a vote of two to three. The company was limited to twenty-five long distance toll booths to be erected in Greensboro, and prohibited from doing any local city business, but has secured an opening which is considered to be a valuable victory from an Independent standpoint.

INDIANA PAPERS WILL HAVE A TELEPHONE NEWS SERVICE.

FRED T. LOFTIN, press agent for the Indianapolis Telephone Company and the New Long Distance Telephone Company, R. F. Rinehart and B. Q. Hendricks, all of Indianapolis, have organized and established a "Telephone News Service" for the afternoon daily and other papers of the county seats throughout Indiana. For a weekly rental or charge a complete and comprehensive news service is to be telephoned to these papers every afternoon, thereby enabling them to keep abreast with the metropolitan dailies. The lines of the New Long Distance Telephone Company are to be used exclusively in this service.

FARMERS ORGANIZE THEIR OWN TELEPHONE COMPANY IN WASHINGTON.

ALMOST 100 farmers recently met in Bellingham, Wash., for the purpose of electing officers in the Farmers' Mutual Telephone Company of Whatcom County. It was the largest gathering of farmers ever seen in the city and showed beyond possibility of question that the tillers of the soil are interested in the rural telephone project.

President Edward Brown, who acted as chairman of the meeting, explained the relation of the company to the Home Telephone & Telegraph Company, which secured a franchise in Bellingham ten days previously, and spoke briefly of the first-class automatic system which is soon to be installed.

The following directors were elected: L. Norton, Blaine; James Bailey, Nooksack; L. G. Van Valkenberg, Sumas; Edward Brown, Custer. Those interested predict a rapid and substantial development for the new company.

NEW PLANT IN BEAUFORT, S. C.

AN entirely new switchboard equipment has recently been installed at Beaufort, S. C., by R. A. Long, proprietor of the People's Telephone Exchange. The entire upper floor of one of the largest buildings in the city is used for the exchange, and quarters for the operating as well as maintenance departments. The floor of the operating room is covered with a felt and cork carpet, which is absolutely noiseless.

Besides the new switchboard equipment a good deal of line reconstruction has been done. Two 200 pair aerial cables have been installed, and a 100 pair underground is being extended through the business portion of the city.

The switchboard has a present capacity for 300 subscribers' lines with terminal capacity for 400.

TELEPHONE INTERESTS TO BE WELL REPRESENTED AT THE CHICAGO ELECTRICAL SHOW.

THE various telephone interests throughout the country have taken an unusually keen interest in the coming electrical , to be held in the Coliseum from January 15 to 27, and much that is new in telephones will be shown. Prominent telephone men from all parts of the United States will attend the show and three days—January 22, 23 and 24—have been set aside as "telephone" days. One of the interesting things to be shown by the Chicago Telephone Company will be the "theatrephone," by which

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visitors at the exposition will have a chance to hear the music of one of the performances at the downtown theatres during the two weeks of the exposition. Arrangements have been made by which the "Prince of Pilsen," playing at the Studebaker at that time, will be put on the "theatrephone." By this scheme people may hear the opera almost as well as they would were they in the theatre.

Efforts are being made by the management to get Prof. E. L. Ovington to come to Chicago during the show. By the use of the "high frequency currents" as publicly tested by Prof. Ovington, it is possible to pass 200,000 volts through the human body without any evil effects resulting. The ordinary current used at Sing Sing to kill a man is 5,000 volts alternating current, although 3,000 is considered sufficient. Prof. Ovington says: "The ordinary alternating current of electricity is a vibratory form of energy which oscillates so slowly that it effects our senses. If this same current is made to vibrate faster there will be no effect upon the sensory system. This is actually what the "high frequency apparatus accomplishes."

In the first of recent tests one lamp was held against the professor's forehead and the other against his shins; they both became brilliantly illuminated. In the next experiment Prof. Ovington allowed Dr. De Forest to transmit a wireless message through his body to an operator at the other end of the garden.

The complete list of exhibitors to date is as follows: Ackerman-Boland Company, Allis-Chalmers Company, American Circular Loom Company, American Conduit Company, American De Forest Wireless Telegraph Company, American Electric Company, American Electric Fuse Company, American Novelty Company, American Steel & Wire Company, American Electric Sign Company, AMERICAN TELEPHONE JOURNAL, Automatic Electric Company, Bryan-Marsh Company, Central Electric Company, Chicago Battery Company, H. B. Camp Company, Chicago Compound Battery Company, Chicago Edison Company, Chicago Pneumatic Tool Company, Chicago Telephone Company, Frank B. Cook, Crane Company, Crocker-Wheeler Company, W. P. Crockett & Co., Electric Appliance Company, Electro-craft Publishing Company, Electro Dymanic Company, W. L. Freed Company, J. Lang Electric Company, Edwards Headlight Company, *Engineering World*, Electric Storage Battery Company, Federal Electric Company, Fort Wayne Electric Company, North Shore Electrical Company, Sam J. Gorman & Co., Guarantee Electric Co., General Storage Battery Company., D. Holcombe & Co., Safety Armorite Conduit Company, W. H. Schott, W. Schiedel Company, Simplex Electrical Company, Stanley G. I. Elec. Mfg. Co., C. H. Thordarson, Engineer Publishing Company, Universal Electrical Company, Vesta Accumulator Company, Western Electric Company, Wagner Electric Manufacturing Company, Westinghouse Electric and Manufacturing Company, *Western Electrician*, General Electric Company, Haller Machine Company, H. T. Paiste Company, Krantz Manufacturing Company, Lincoln Electrical Manufacturing Company, Monarch Electric Wire Company, Miller Anchor Company, Mark Manufacturing Company, McFell Electric Company, Nungesser Electric Battery Company, Oliver Manufacturing Company, Overbaugh & Ayres, Osburn Flexible Conduit Company, Peabody Coal Company, Peru Electric Manufacturing Company, Porter & Berg, Peterson Manufacturing Company, J. A. Roeblings Sons Company, Roth Brothers, Reynolds-Dull Flasher Company, J. L. Schureman & Co., Stromberg-Carlson Manufacturing Company, Swedish-American Telephone Company.

An especially interesting feature at the Show will be the four-page daily edition of *The Electric City*, a paper which is ordinarily published once a month by the Chicago Edison Company. In these special issues will be described each day several interesting features, such as machines, electrical effects, etc. This work will be extremely useful in directing attention to the most noteworthy portions of the various exhibitions.

DEATH OF HENRY A. TAYLOR.

IN the loss of Henry A. Taylor of Lafayette, Indiana, who died on December 18 after a short illness, Independent telephone men have received a sad shock.

Mr. Taylor was born in Lafayette thirty-seven years ago. He was educated at Purdue University, and after leaving college he went into the private bank conducted by his father. Upon the death of his father he conducted the business, and by merging it with another banking house established the American National Bank, of which he was president.

The place held by Mr. Taylor in his native city was an important one. He was prominent in its business development, and his rare and skilful judgment, vigor and perseverance, as well as his willingness to subdue his personal interests in favor of a generous concern for the good of the community brought the city valuable advantages through his work in many public affairs. In Independent telephony he was one of the pioneers in his State. He entered the field in 1894 as secretary of the Harrison Telephone Company of Lafayette, and ever since that time was a prominent figure among leading telephone men. He was one of the principal owners of the Lafayette Telephone Company. When the Sterling Electric Company moved to Lafayette he became associated with this large manufacturing company, and since then has always been identified with its management, either as a director or an officer. At the time of his death he was vice-president.

Henry A. Taylor.

In his dealings with men he enjoyed to the fullest extent the friendship, confidence and respect of all with whom he came in contact. In business his skill and integrity were of the highest order. In public service he was progressive, disinterested and faithful. In social affairs his cheerful spirit endeared him to all of his numerous associates. His watchfulness for their welfare had made him loved by the employees of the business concerns with which he was identified; and to his home he brought much happiness.

To his native city, his State, and the interests of Independent telephony his death, at a time when life would so surely have enabled him to carry out so many good and important plans, was a great loss which has brought sorrow to the many people who remember the good work he has done and his charming personality.

OPENING OF INDEPENDENT EXCHANGE IN DANBY, N. Y., AROUSES ENTHUSIASM.

THE stockholders and subscribers of the Danby Telephone Company held a meeting in the Danby town hall on December 16 to celebrate the successful completion of the company's new plant. The line is one of the best equipped in the country. The subscribers may communicate with those connected to the lines of the Ithaca Independent Company as well as their own city.

The company has about 80 subscribers in Danby City, and at the opening of the exchange practically all of the subscribers and their families were present. The meeting had many interesting features, including singing by the Cornell Agricultural college quartette and addresses by Prof. Roberts and Prof. Baily of Cornell. R. B. Fegan, manager of the Ithaca Telephone Company, and other representative Independent men from neighboring districts were present, and the occasion was a most satisfactory demonstration of the popular approval of the new facilities afforded by the Independent telephone companies.

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The Development of the Telephone Cable

(*Continued from page 446.*)

of lead. It was soon observed that creosote, which was used in the ducts then in vogue, caused the sheath to deteriorate. After considerable experiment it was found that if from 2 per cent. to 3 per cent. of tin was added to the lead, the result was an alloy which the creosote was unable to attack. This practice is still maintained even where the iron pipe, or earth tiling has replaced the creosoted wooden tubing. Some cable manufacturers object to the mixture of tin with the lead, on the ground that under this condition the sheath is not as strong mechanically as where pure lead is used. A few manufacturers make a sheath of pure lead and surround it with a coating of tin, claiming that in this way the tin being on the outside is in a position to do the most good in the way of resisting chemical action, while at the same time not being mixed with the lead, does not impair its tensile strength.

The dry core cable just described represents the most advanced type for subscriber lines and local trunks. Whatever changes have been made in it, were in the direction of accommodating a greater number of conductors within a sheath of given diameter.

The rapid growth of the business in large cities where the cost of subways is high has caused attention to be turned towards increasing the number of conductors within a given sized sheath. As a result cables are now made up of number 22 B. and S. gauge wire. The injury to transmission resulting from the change is more apparent than real, since as the business increases, the various telephone districts are reduced in area and the average length of the subscribers' lines therefore shortened. Whatever loss may result in transmission is more than compensated by the increased efficiency of the ducts. Using this size of conductor, cables containing as many as 500 pairs have been constructed of a diameter sufficiently small to readily pass through a standard 3 inch duct. In these cables the conductors being more closely packed together, there is a higher mutual capacity than where number 19 B. and S. gauge wires are used.

Submarine Cable.—Since, in a long open wire line sections of submarine cable are very numerous, it is important to reduce the capacity and conductor resistance to as low a figure as possible. The streams to be crossed are for the most part, narrow, and of such a nature that the cable can be laid in a trough on the bottom. Armor is not absolutely necessary, and double sheath lead cables are used for this purpose. A type of cable developed for long distance submarine cable service has a sheath covered with a coating of enamel, which serves not only to prevent corrosion, but also to raise the insulation resistance. As it is still in the experimental stage, only one having been put into service, no figures are obtainable, as to its length of life, or cost of maintenance.

Aerial Braid Covered Cables.—An extensive demand exists for cables that are not covered by a lead sheath. For example, these are used in distributing from terminal points to subscriber's premises by overhead construction; or in looping in long toll lines at test points. Rubber is used as a means of insulation, and a heavy braid covering as a means of protection against mechanical shocks and the action of the elements. These cables are constructed in the following manner: The conductors are covered with a rubber insulation having a thickness of about 5-32 of an inch. The rubber is covered with a layer of tarred tape, and the conductors forming pairs twisted together, the length of the lay not exceeding 6 inches. The pairs are laid up around a central core of jute, and are bound together by a layer of jute. Over this serving are placed two layers of heavily tarred tape, which in turn is covered by a closely woven cover of cotton braid, also heavily tarred. The conductors of this type of cable are made of hard drawn copper wire, with a coating of tin to prevent corrosion by the rubber. For local work on subscribers' lines, these cables are made up in sizes of from 3 to 25 pairs. The usual size of the wire is 18 B. and S. gauge. For long distance work, 6 pair and 11 pair cables are used. The purpose for which a long distance company uses this class of cable is for cutting in at test and operating stations. Where the station is at an intermediate point, the lines have to be looped in and out. Since it is the custom to use one cable to a cross arm, the cable must contain twice as many conductors as are accommodated on the cross arm. If therefore, the poles are equipped with 10 pair cross arms, 11 pair cables must be used. If on the other hand 6 pair cross arms are to be dealt with, 6 pair cables are employed. Wherever the station is a terminating point of the line, 6 pair cables are used for 10 pair cross arms; and if the pole is equipped with 6 pair cross arms, 6 pair cables are used, each one being split between two arms. The capacity of this class of cable being necessarily high, only short lengths must be employed. Since on long lines, where the number of test points is large, the total number of feet of this class of cable is equal to the sum of the length of the cables at each point, in actual practice, lengths of cable used for cutting in are not allowed to exceed 75 feet.

There is still one other use to which cables of this class are put, and that is for patching open wire lines at points where breaks have occured. If, for example, 8 or 10 sections of a line have fallen, a length of emergency cable is run between the two good poles on opposite sides of the break, and the lines continued through this until the poles can be reset and new wires strung. This cable partakes of the same characteristics as those already described with the possible exception that the outside braid covering is heavier. These emergency cables contain 25 pairs.

(*To be continued.*)

QUERIES—Continued

BUSY TEST ON MAGNETO SWITCHBOARD.—(640.)

(*Continued from page 447.*)

SJ, tip of plug, upper lever *E* of the operated listening key *LK*, through operator's head telephone *OR* and 500 ohm retardation coil *TR* to ground *G*, which is the other side of battery *TB*. Sufficient current will flow through this circuit to give the operator a reliable "click" each time the tip of the plug is touched to the jack sleeve.

The use of the 2 M. F. condenser *C* is to prevent a false busy test from the answering half of the cord when testing. It will be noticed that when the listening key *LK* is thrown, as illustrated in Fig. 640*c*, the contact *B* opens, disassociating the tip of the answering cord from the tip of the calling cord, but in order to make a continuous path for voice currents the 2 M. F. condenser *C* is connected across this opening by means of the extra contacts *A*. If the condenser were absent the tip of the calling cord would receive a potential from the test battery *TB*, through the 500 ohm retardation coil *CR* of cord circuit No. 2, sleeve of answering cord (not shown), sleeve of jack of the line just answered (not shown), calling subscribers' telephone (not shown), tip of same jack (not shown), to tip of answering plug of cord circuit No. 2. With this condition a click would be had when testing a non-busy line, as, for example, if the tip of the calling plug of the cord circuit in question was touched to the jack sleeve *SJ* of Fig. 640*b*, C, which is normally at a ground or zero potential, a circuit back to the ground side of battery *TB* would be had through the 600 ohm non-inductive resistance *LR* to *G*. However, the use of the condenser C separates the answering tip from the calling tip with respect to direct current flow so that this false busy test is prevented.

It is not necessary to provide any special coils in full metallic lines, as shown in Fig. 640*a*, A, due to the individualization of the sleeves of such circuits and the absence of ground connections.

The test circuits shown have been used on some of the largest magneto multiple switchboards made and were abandoned only as modern central battery boards replaced the old equipment.

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FOR SALE

Advertisements under this head, $1.00 for 25 words or less for each insertion. Prepaid.

FOR SALE, CHEAP—600 pairs self-soldering protectors. Also one 300 pair and one 500 pair main distributing frame, used less than two months. Will sell separately or together. Address Virden Telephone Exchange, Virden, Ill., or Girard Telephone Exchange, Girard, Ill. 420

FOR SALE—February 1st we will cut over the central energy and will sell all or a part of the following: Kellogg Magneto Express Switchboard, Lamp Transfers, Seven Positions, 150 numbers each; Kellogg Iron Distributing Frame, capacity 1,250 numbers, with 900 arresters installed; Holtzer-Cabot, Direct Connected Motor Generator, Charging Machine; Holtzer-Cabot Direct Connected Motor Generator, Ringing Machine; Four Cells, No. E-9 Chloride Accumulators, Marble Power Board, 900 Magneto Telephones. This apparatus is practically new, and at present in operation, giving good service. It can be seen and examined by parties interested. Address Lynchburg Telephone Company, S. H. D. Freed, Manager, Lynchburg, Va. 517.

SUPPLIES WANTED

WANTED—Eight second hand magneto telephones in good working order. State price and make, and how long in use. Address Box 511, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 511

WANTED

WANTED—Cableman willing to take hold of other telephone work when there is nothing doing on cable. Must be a worker and a stayer. Send references. Address Zenith Telephone Company, Duluth, Minn. 520

WANTED—Continued

Advertisements under this head 25 cents for 25 words or less for each insertion. Set in bold face type $1.00 per insertion for 25 words or less.

WANTED—Position as manager or construction foreman. Have had about 5 years' experience. Am familiar with operating and construction work. Satisfaction guaranteed. Address Box 518, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 518

A SOUND proposition always appeals to the sensible man. That our proposition is a sound one is proven by the fact that we have placed thousands of competent men in desirable positions. If you are dissatisfied with the opportunities offered by your present position, it will be to your advantage to call at our nearest office for information or write for booklet. Hapgoods, Suite 511, 309 Broadway, New York City. 464

WANTED—A first-class telephone accountant and auditor by a large Independent company. Must have considerable experience, come well recommended and be fully competent to take entire charge of both constructing and operating accounts. Address Box 505, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 505

WANTED—Traveling salesman, calling on the telephone trade, who can sell an article used by every large telephone company. Address Box 519, care THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 519

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And Heavy Snowing,
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For a *Drive* and *Twist* Installs It, So That Is What We Call It.
It's the Giant of All
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TELEPHONE PATENTS

RESTORING RING OFF DROPS.

Edward McLean, Greencastle, Ind., patents (No. 807,575; dated Dec. 19, 1905; filed Nov. 21, 1904; serial No. 233,663) a means for restoring ring off drops on switchboards.

In this invention a pivoted lever is mounted below the cord shelf, one end forming a support for the plug when out of service, the other being bent at a suitable angle and projecting upward immediately below and in front of the shutter of the ring off drop, mounted above the cord shelf. The shutter is provided with an extension piece. When the weight of the cord and plug is removed from the pivoted lever the upturned end falls on account of its greater weight and length. A disconnect signal being received, the shutter of the ring off drop falls. The operator then withdraws the plugs from the associated jacks and returns them to their normal positions. Their weight causes the upturned end of the lever to rise and this in turn comes in contact with the extension piece of the drop shutter, forcing the shutter upward to its normal position.

TELEPHONY.

Francis W. Dunbar, Chicago, Ill., patents (No. 803,676; dated November 7, 1901; filed November 12, 1904; serial No. 252,439) a system of telephony.

This invention relates to the disposal of the transmitting, receiving and auxiliary apparatus of a telephone circuit with a view to reducing the resistance offered to the passage of the voice currents emanating from the transmitter, and also to securing a substantially uniform operation of the various parts irrespective of line resistance. To this end several novel circuit connections are given, which are reproduced herewith in Figs. 1 to 5.

The essential feature of the circuits is the arrangement of the transmitter, preferably of high resistance, in parallel with the receiver to eliminate the inductive effects of the latter instrument. This the inventor claims accomplishes two very important results. First, the attainment of a given watt variation of the voice currents at the transmitting end at a lower potenial and greater amplitude of the current than can be secured when the transmitting and receiving conductors are in series with each other at a sub-station, as a result of which the voice currents are received at the distant receiving instrument with smaller loss due to the electrostatic capacity of the conductors over which they are transmitted. The other result resides in the fact that the transmitter automatically adjusts the range of variation in its resistance so that the range will be greater over lines of greater resistance to compensate for the reduced current and less over lines of lower

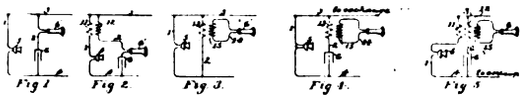
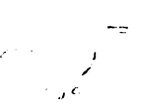


Fig 1 Fig 2 Fig 3 Fig 4 Fig 5

resistance to compensate for increased current, whereby the wattage over lines of widely varying resistance as well as over lines of substantially equivalent resistances is more uniform than was possible with the practice hitherto obtaining whereby the receivers at receiving stations are operated with substantially uniform efficiency by the transmitting stations irrespective of the comparative lengths and resistances of the telephone lines united by the cord connecting apparatus of a common battery system. Peculiar efficiency is obtained by the employment of transmitters using carbon granules, for this style of transmitter causes a decrease in the resistance of the transmitting conductor when the current therethrough is increased and causes said resistance to increase when the current therethrough is decreased. It will be seen, therefore, that on the shorter lines there is a greater volume



of current from the common battery. Hence the transmitter opposes less resistance to the passage of such current. On the longer lines the volume of current is decreased, owing to the increased line resistance, the carbon granules serving to increase the resistance offered to the decreased current, whereby the percentage variation of the entire transmitting cirruit is maintained substantially constant irrespective of the length of the connected lines.

Figs. 6 and 7 indicate a granular carbon transmitter of the preferred type to be employed; the mechanical and electrical features of which will be evident to those skilled in the art.

In all there are twenty-one claims made by the inventor, which broadly cover the circuit arrangements of the apparatus.

TELEPHONE INSTRUMENT.

Egbert A. Reynolds, New York, N. Y., patents (No. 804,431, dated Nov. 14, 1905; filed Aug. 19, 1904; serial number 221,364; assignor to the Iron Telephone Company of New York) a telephone instrument.

The essential features of this device are simplified means for the assembly of the parts of a complete coin controlled party line telephone enclosed in a metallic case. When necessary for repairs, the withdrawal of a plate carrying the various parts can be accomplished without removing the instrument case from the wall.

The interior of the case is vertically divided into two parts by a metal diaphragm, which forms the principal feature of the claim. This diaphragm is arranged to slide in guides so as to be readily removed. Upon it can be mounted the induction coil, hook, ringer mechanism and privacy device. The front position of the case is hinged and carries the transmitter. The other half of the case is arranged to contain the money safe. This is so placed as to permit its being opened from one side of the casing, a part being cut away for this purpose. The money safe may readily be withdrawn without opening the front of the machine, while opening the front for examination of the working parts will not permit the removal of the money safe unless it be unlocked in the regular way.

TELEPHONE ATTACHMENT.

Joseph Silverman, San Francisco, Cal., patents (No. 806,372; dated December 5, 1905; filed May 26, 1905; serial No. 262,357) a telephone attachment.

This patent relates to a device for holding a telephone receiver of a desk stand in position for hearing, thus leaving the user's hands free for other work. It essentially consists of a base or stand to hold the desk instrument, and is provided with a vertical standard, having an extending arm to hold the receiver which is attached thereto. The control of the hook for opening and closing the circuits is secured through a system of levers operated by the pressure of the ear against the receiver.

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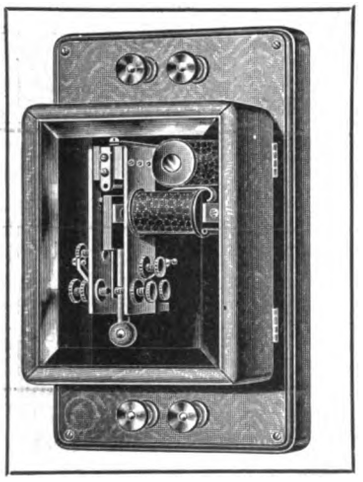

That the Sandwich Pole-Changer, "while its appearance in the cut is strikingly similar to the Illinois," it is a very different and much better instrument. The Sandwich Pole-Changer Company is not the successor of the Illinois Electric Specialty Company. They simply purchased the tangible property of the Illinois Company last June, who had been doing business at a loss for several years, and this is the reason why *their suit went by default.*

The Sandwich Pole-Changer was put on the market by E. C. Hennis, who employed the most careful and able Patent Attorneys to see to it that this instrument was absolutely non-infringing, and it infringes no patent, then or since issued on Pole-Changers.

The Sandwich Pole-Changer Company is strongly backed financially, and is placing these instruments on the market by the hundred each month, and will protect the interests of its customers and users, as well as its own, to the end.

The Sandwich Pole-Changer is an up-to-date instrument made by the best of mechanics, of first class material. Sent on thirty days' free trial, and is in the market to stay.

SANDWICH POLE-CHANGER COMPANY

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Please mention THE AMERICAN TELEPHONE JOURNAL when writing to ADVERTISERS.

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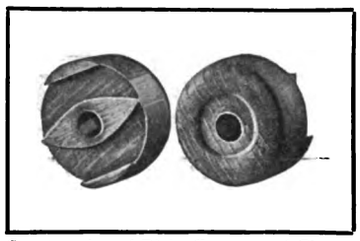
IN THE MANUFACTURING FIELD

"SUCCESS LIES IN THE KNOWLEDGE OF OUR TOOLS"

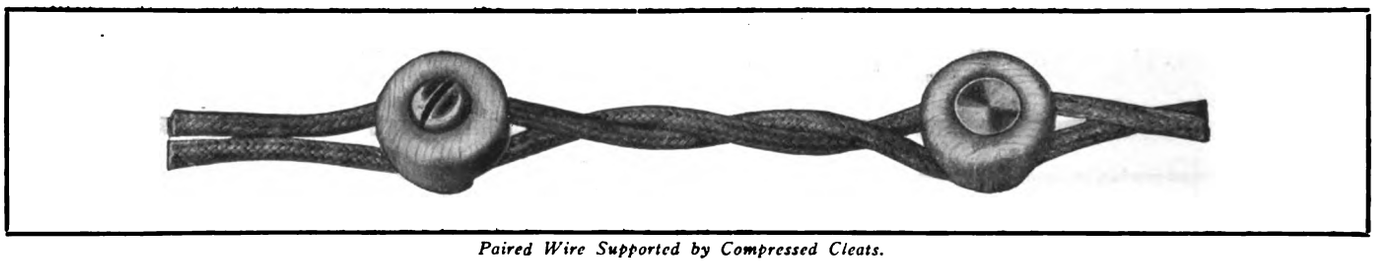
A NOVEL WIRE SUPPORT.

A COMPRESSED cleat designed for the support of wires for low voltage circuits in all interior wiring, such as telephone, telegraph, messenger call, annunciator and bell work, has been put upon the market by the Blake Signal & Manufacturing Company, 246 Summer street, Boston, Mass.

These cleats are made of compressed material, treated so as to be impervious to dampness and moisture, and the manufacturers claim for them many advantages not possessed by the usual form of porcelain or fibre cleats. The illustrations show the method of using the cleats and their construction. They grip the wires firmly, and, at the same time, as the wires are separated at the points where clamped, there is no injury to the insulation. The cleats may be fastened either by the use of nails or screws, and the material of which the cleats are constructed is so firm that no ordinary usage will cause it to break. Even the blow of a hammer used for driving wire nails to hold the cleats does not injure this form of support. The manufacturers claim that when stringing long lines of wire the grip maintained by the use of these cleats is so firm that the end supports will hold the slack until the wire is secured at intermediate points.



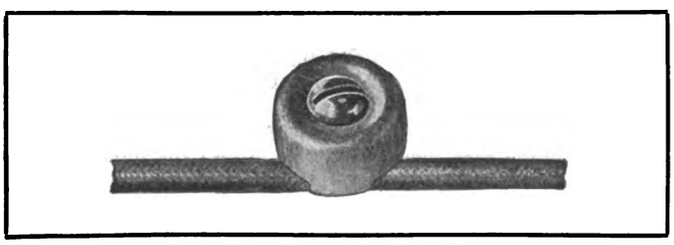
Construction of Blake Compressed Cleats.



Paired Wire Supported by Compressed Cleats.

Besides possessing these numerous practical advantages from an installation standpoint, these cleats are sold at a price much lower than that charged for either porcelain or fibre cleats. The manufacturers report a large demand for them, and that the users express the highest degree of satisfaction with the results obtained. Information, prices and samples will be cheerfully sent on receipt of a request by the company.

THE CONNECTICUT TELEPHONE & ELECTRIC COMPANY, Meriden, Conn., has recently issued catalogues Nos. 9 and 10, dealing with "central energy intercommunicating telephones" for interior systems, and "long distance" telephone equipment, respectively.



Single Wire, Clamped by Blake Cleat.

In catalogue No. 9 are described the various switching devices and styles of mounting them for both desk and wall instruments, as used in the well known intercommunicating systems sold by the Connecticut Company. In this catalogue are illustrations and descriptions of both the ordinary and flush type of wall switches, as well as the instruments designed for mounting with them; also a hand microphone and several types of desk stands. The illustrations of the instruments give an excellent idea of their appearance, and show that the company has a line of especially attractive designs. In addition to the purely descriptive matter, there are diagrams of wiring for different systems employing the apparatus described in the catalogue; also a brief list of the troubles which sometimes arise in intercommunicating systems, a statement of their causes, and methods of clearing them. Catalogue No. 10 is devoted more particularly to a description of the various types of long distance instruments and switchboard equipment manufactured by the company. In it are illustrated several types of wall sets for service under different conditions, including several instruments designed for the use of dry batteries contained within the instrument, and also common battery types of instruments and desk stands. Several illustrations and descriptions of small switchboards are given, and, in addition, small pieces of apparatus, such as generator, hook switch, jacks, receivers, arresters, etc., are separately described and illustrated. Both of the catalogues contain much interesting descriptive matter, and persons interested in the subjects which they cover will be well repaid for their trouble in requesting the manufacturers to forward copies.

THE NEWVILLE LOCUST PIN COMPANY, NEWVILLE, PA., has been chartered with a capital of $5,100 to manufacture locust pins for telephone cross arms, etc. John S. Searight, of Carlisle, is treasurer and a director. The other directors are Walter Stewart of Carlisle and Charles F. Wallihen of Front Royal, Va.

THE STROMBERG-CARLSON TELEPHONE MANUFACTURING CO., Rochester, N. Y., reports some big shipments of cable to Bloomington, Ill. From all that can be learned it is evident that this company is doing a great deal of business in this line. Mention is made of the fact, in a recent booklet issued regarding this material, that it has found it necessary to increase the capacity of its plant four-fold in two years. This enlargement is extremely satisfactory to the company, since the large increase is in part due to orders for extensions of present large plants using Stromberg-Carlson cable. The company's careful attention to details of manufacture and testing results in a most satisfactory product.

J. S. BOGGS AND JAS. H. MCNEILL have recently consolidated their interests in a new corporation, under the name of Boggs and McNeill Co., with headquarters at Albana, Ga. The company is at present operating two factories for the manufacture of lumber and yellow pine cross arms, and would be pleased to hear from telephone companies about to purchase such material.

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Electrical Show

Chicago, January 15th to 27th, 1906
AT THE COLISEUM

TELEPHONE DAYS JANUARY 22-23-24

This show will surpass any electrical exhibition ever held. More capital from the electrical field will be represented than at the World's Fair at St. Louis or Chicago. Telephone equipment of every description will be one of the main features. Prominent telephone men from all parts of the United States will be in attendance. This telephone meeting will be one of a strictly grand good time as well as instructive. The leading Independent manufacturers will make elaborate exhibits and on a much grander scale than ever before attempted. Standing committees of all the Independent Associations are cordially invited to attend as well as the individual exchange owners. Those that can come please drop a card and notify Thos. R. Mercein, Manager, 464 Monadnock Bldg., Chicago.

Associations desiring to hold meetings at the show will be provided with quarters in the Coliseum Building free of charge.

Electrical Trades Exposition Co. Chicago

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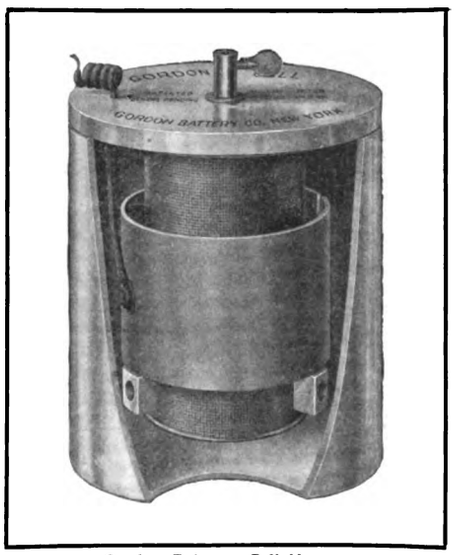
IN THE MANUFACTURING FIELD

A GORDON PRIMARY CELL.

PRIMARY cells of large capacity which will be able to withstand heavy rates of discharge are in demand for many classes of electrical work. A cell of particular interest, because it fulfills these requirements, is the No. 3 Gordon cell, manufactured by the Gordon Battery Company, New York. This cell, which is portrayed in the accompanying illustration, has a capacity of 300 ampere hours. The jar and cover are made from porcelain to better withstand the changes of temperature and hard usage. The cell is 6¾ inches in diameter and 9¾ inches in height. It is largely used where a strong current is required such as is needed for sparking in gas engines, operating fire and police alarm signals, etc. Among the many advantages claimed for this type of battery are the guaranteed number of ampere hours according to rated capacities, simplicity of construction, equally good results obtainable on open or closed circuits, minimum expense for renewals and impossibility of local action. The company manufactures twelve different types of cells, varying in capacities from 100 to 1,000 ampere hours. Catalogues furnishing full particulars will be mailed to interested parties upon request.



Gordon Primary Cell No. 3.

COST OF OPERATING AUTOMATIC SYSTEM.

GENERAL MANAGER C. E. TARTE of the Citizens' Telephone Company of Grand Rapids, Mich., has recently given out some very interesting figures showing the cost of operating his exchange before and after the introduction of the system installed by the Automatic Electric Company, Van Buren and Morgan streets, Chicago. These figures, with explanatory comments of Mr. Tarte, are given in the following comparative statements of expenses for periods which are taken as affording a basis for a fair comparison:

Operating Expenses, Manual Exchange, for year ending December 31, 1903:

Exchange Labor $32,120.28
(This includes Local Operators, Traffic Manager, Information Clerks, Switchboard Men, and Rack Man.)

Inspection Department....$8,039.38
(This includes Wire Chief, Troublemen, Trouble Clerks, and Supply Boy, but does not include Installers and Movers. They are kept in a different account and their time charged to Maintenance or Construction in accordance with the work done.)

Maintenance Wagon and Reconstruction Wagon..$6,648.57
(These two were combined in pay rolls at that time.)

$46,808.23

There were 4,839 telephones in service at the beginning of the year and 5,115 at the end of the year, an average of 4,977.

Above departments cost $9.40 per telephone per annum.

Operating Expenses, Automatic Exchange, for year ending June 30, 1905:

Exchange Labor.....$3,601.42
(This includes Rural Operators, Traffic Manager, Information Clerks, Switching Operators, and part of Matron's time.)

Switchboard Men $5,981.00
(This includes Switchboard Men and Rack Man.)

Inspection Department....$10,720.00
(This includes Wire Chief, Trouble Clerks, Troublemen, and Supply Man, but does not include Installers and Movers. They are kept in a different account and their time charged to Maintenance or Construction in accordance with the work done.)

Maintenance Wagon Labor.$4,440.00

Reconstruction Wagon Labor 3,440.00

$28,182.42

There were 5,605 telephones in service June 30, 1904, and 6,633 in service June 30, 1905, an average of 6,119.

Above departments cost $4.60 per telephone per annum.

It should be noted that the automatic exchange operated an average of 1,142 telephones more than the manual. With the same number of telephones in operation the total cost of the manual system would have been $57,543.03, against $28,182.42 for the automatic—a difference in favor of the latter on an average of 6,119 telephones of $29,360.61.

AUTOMATIC EXCHANGE.

DETAILS OF OPERATING EXPENSE FOR THE MONTH OF JUNE, 1905.

6,351 AUTOMATIC TELEPHONES IN SERVICE, JUNE 1, 1905.

Traffic Manager, $85 ($40 of this charged to toll traffic)...	$45.00	
3 Day Information Clerks, $30, $30, $25.....	85.00	
3 Noon and Evening Clerks, $30, $25, $20.....	75.00	
1 Number Clerk, keeps up number records, etc.....	28.00	
2 Day Switching Operators at Multiple Section, $28, $25..	53.00	
1 Evening Switching Operator at Multiple Section.....	18.00	
Part of Matron's Time.....	15.00	
		$319.00
1 Chief Switchboard Man.....	$85.00	
1 Switchman	65.00	
1 Switchman	65.00	
1 Switchman	60.00	
1 Switchman	60.00	
1 Switchman	55.00	
1 Switchman	55.00	
		$445.00
1 Rackman	$50.00	$50.00
1 Wire Chief.....	$80.00	
1 Assistant Wire Chief	60.00	
1 Clerk	40.00	
1 Clerk	30.00	
5 Troublemen, at $60.....	300.00	
6 Troublemen, at $55.....	330.00	
1 Troubleman, at $50.....	50.00	
1 Supply Man	55.00	
		$945.00
MAINTENANCE WAGON.		
1 Foreman	$70.00	
2 Linemen, at $60.....	120.00	
Wagon and Driver	71.50	
		$261.50
RECONSTRUCTION WAGON.		
Foreman	$65.00	
3 Linemen, at $60.....	180.00	
Wagon and Driver.....	71.50	
		$316.50
Total Operating Expense...		$2,337.00

In addition to the above employes, we have in what we call our inspection department, one cable troubleman, and during the month of June we had ten men known as installers and movers.

About one-half of the time of the installers and movers is put in in moving telephones, re-wiring, changing circuits, etc., and the other half is employed in installing new telephones, and we therefore charge one-half of this force to construction and the other half to maintenance.

I also show salaries paid the operators in our local exchange for handling rural subscribers. This has never been shown before, but I deemed it wise to give this information so that if anything should come up in regard to how we take care of our rural lines full information would be given on the subject:

1 Cable Troubleman	$60.00	
9 Installers and Movers, one-half charged to Construction and one-half charged to Maintenance.....	205.00	
$55, 55, 55, 50, 50, 50, 35, 30, 30=$410.		
		$265.00
209 RURAL SUBSCRIBERS.		
2 Day Rural Operators, $25, $25.....	$50.00	
2 Evening Rural Operators, $18, $18.....	36.00	
		$86.00
Grand Total		$2,738.00

Owing to the completeness of these figures and the extremely valuable information which they give, they should prove extremely interesting to all telephone men.

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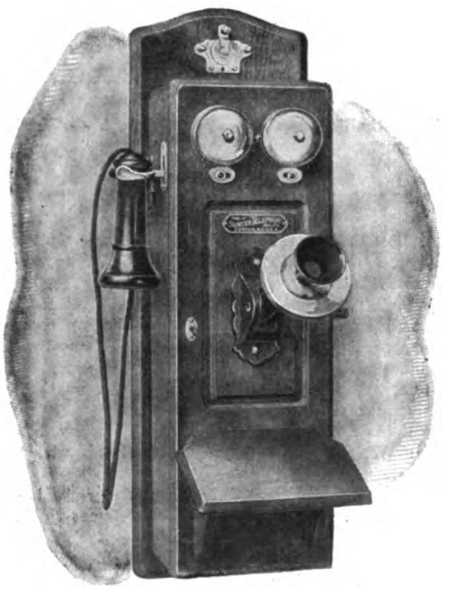
The Other Fellow's Business



always interests us.

There are so many good Telephones made now, that we have to keep hustling to lead the procession—not such an easy job.

But with our "MAMMOTH" we have a world beater.

So many good points, that we can't get 'em all in this space.

We will say this however,

This instrument will *ring all the bells* it is practical to put on one line, and— —

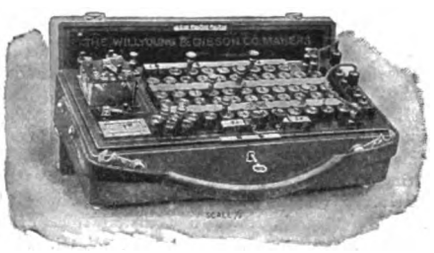
It will TALK in a manner that will surprise you.

A FACTORY stands back of this instrument, *every* part is made *right*, RIGHT HERE.

THE SUMTER TELEPHONE MANUFACTURING CO.

SUMTER, S. C., U. S. A.

TELEPHONE TROUBLES



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(Circular 500A)

We have a well-organized factory and trained staff whose principal business it is to keep telephone men and telephone systems out of "trouble." We never fail where people are willing to be helped. We help all along the line—our instruments and methods test the copper for conductivity and the sheathing for insulation before the cable leaves the factory; Willyoung instruments test the receiver magnets and coils, the "drop" resistances, the condenser capacities, etc. If anything goes wrong during installation we tell you just where it is; if anything ever gives out on the completed system we tell you where *that* is.

CAN YOU AFFORD TO DO WITHOUT US?

We make Test Sets, Ohmmeters, Fault Locaters of all kinds, Galvanometers, Faradmeters, Electrometers, in short, everything in the Test Instrument Line for either portable or laboratory use; special instruments for any purpose from our own or customer's designs.

Our Catalog Matter is a Liberal Education.

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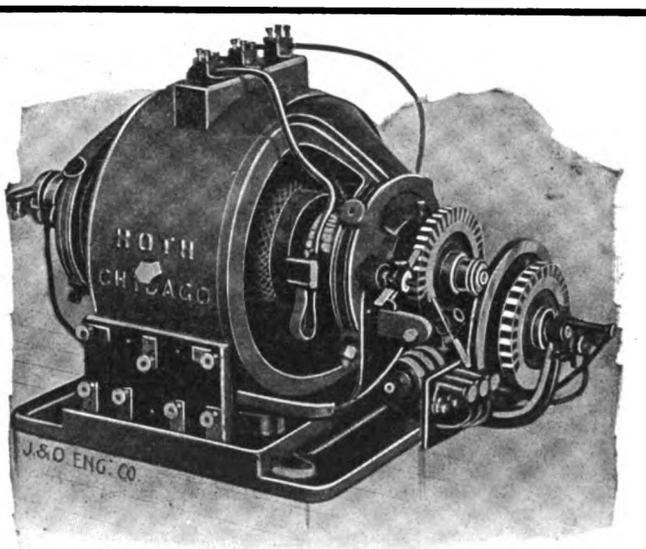

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We make them for any usage and with any capacity.

They are economical in operation and low in maintenance.

There is no guesswork about their design and every piece of material used in their construction is the best than can be secured.

They are easily kept in adjustment and will stand more hard usage than any similar machine.

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FINANCIAL.

TAYLORVILLE, ILL.—The Christian County Telephone Company has increased its capital stock from $10,000 to $250,000.

HARLAN, IA.—The Harlan & Avoca Telephone & Telegraph Company has increased its capital stock from $60,000 to $100,000.

SCHLESWIG, IA.—The Schleswig Telephone Company has increased its capital stock to $20,000.

SURPRISE, NEB.—The Surprise Telephone Company has increased its capital stock from $50,000 to $100,000.

RIVERHEAD, N. Y.—The Baiting Hollow and Roanoke Telephone Company is to increase its capital stock from $20,000 to $40,000.

CLEVELAND, O.—The Cuyahoga Telephone Company has declared its regular semi-annual dividend of 3 per cent.

TOLEDO, O.—The Toledo Home Telephone Company has announced that besides the quarterly dividend of one per cent, an extra one per cent. has also been declared.

MONTELL, TEXAS.—The Citizens' Telephone Company has increased its capital stock from $1,000 to $2,000.

FRANCHISES.

SAN BERNARDINO, CAL.—The Home Telephone Company, of Chino, has applied for a franchise in San Bernardino.

LAMAR, COL.—The Big Bend Rural Telephone Company has applied for a franchise at Lamar.

GILMAN, ILL.—The Eastern Illinois Independent Telephone Company, of Kankakee, has been granted a franchise to operate its lines in the city of Gilman.

HAMMONDSPORT, N. Y.—The Inter-Ocean Telephone Company, of Buffalo, is endeavoring to obtain a franchise in Hammondsport to install a telephone exchange.

MIDDLETOWN, N. Y.—At a meeting of the Common Council on December 11, permission was given the Middletown Telephone Company to enter the city and set a small line of poles, subject to the consent of the property owners. This will enable the company to get a central office in the city, despite the antagonism of the Orange County Telephone Company, which is now connected with the Bell interests.

MARION, N. D.—A franchise has been granted to the La Moure County Telephone Company. Headquarters of the company will be at Marion.

VALLEY CITY, N. D.—The Valley City Telephone Company is asking for an extension of franchise for twenty years.

ROANOKE, VA.—The Virginia & Tennessee Telephone Company has been granted a franchise at Roanoke.

TACOMA, WASH.—The Independent Telephone Company has been granted a franchise at Tacoma.

BRANTFORD, ONT., CAN.—The Canadian Machine Company and Ontario Telephone Company are endeavoring to secure a franchise in this town for a telephone system to compete with the Bell Company. These companies offer great reductions from the prices being charged by the present company.

COMBINATIONS.

LARGO, IND.—F. E. Fults and D. L. Snowden, composing the Andrews Telephone Company, have sold the Andrews plant to Taylor & Company. The new owners will build a line from Largo to Andrews.

CANTON, KAS.—George Whisman has sold the Canton Telephone Exchange and rural lines tributary to it to the Cottonwood Valley Telephone Company. The new company will build additional rural lines.

BATH, N. Y.—The Niver Rural Telephone Company, connecting Bath and Hammondsport with Mitchellsville and other points, has been acquired by the Pleasant Valley Telephone Company. Extensions will be made.

PRESCOTT, WIS.—The Pierce County Telephone Company has bought the Lane & Munger line, which is operated from Ellsworth to Maiden Rock, and from Herbert to Bay City.

PARIS, ONT., CAN.—The Stark Electric Company, Toronto, has offered $50,000 for the municipal lighting, power and telephone plant. The offer will probably be accepted.

ELECTIONS.

RED WING, MINN.—The Red Wing Telephone Company has elected the following officers: President, A. P. Pierce; vice-president, C. A. Ramussen; secretary and treasurer, D. M. Neill.

CANTON, MO.—The Citizens' Telephone Company of North Missouri at its annual meeting, re-elected its entire board of officers, as follows: J. H. Blackburn, La Grange, president; H. B. Burgess, Williamstown, vice-president; G. W. Vaughn, La Grange, secretary; J. F. Gnuse, La Grange, treasurer; C. O. Raine, general manager; P. N. Hanna, purchasing agent; W. A. Clow, assistant manager.

ROCK PORT, MO.—The Rock Port Mutual Telephone Company has elected the following directors: W. R. Strickland, J. H. Hedgpeth, H. P. Stapel, Geo. H. Sly and John Burg.

ANDES, N. Y.—The Andes and Hamden Telephone Company has elected the following officers: D. D. K. George, president; James Jack, secretary, and Adam Sutherland, treasurer.

CASTLETON CORNER, BOROUGH OF RICHMOND, N. Y.—Officers of the Castleton Corner Independent Telephone Company have been elected as follows: William Hauser, president; William Ikier, vice-president; Henry Hoffman, secretary; George Schaffer, treasurer; Maurice H. Gescheidt, manager; Henry M. Gescheidt, 234 Broadway, New York, attorney.

BELLEVUE, O.—The local Independent Telephone Company recently chose the following directors and officers: Directors—J. H. Beattie, Norwalk; A. K. McConnell, New London; B. T. Hearson, Attica; Wm. Hess, Monroeville; G. A. Wright, John P. Ruffing, Sol. M. Wolf, C. R. Callaghan, Fred Wolfrom, Bellevue; James Verdin, Dover, Delaware; Frank A. Knapp. The only change in the directorate is that Fred Wolfrom succeeds D. Calhoun. The directors immediately elected the following officers: President, Frank A. Knapp; vice-president, John P. Ruffing; secretary, Fred Wolfrom; treasurer, J. H. Beattie; Auditor, Sol M. Wolf.

LYNDEN, WASH.—The Farmers' Mutual Telephone Company has elected the following officers: President, Edward Brown, of Custer; vice-president, J. W. Sefton, of Everson; secretary, S. P. Bailey, Lynden; treasurer, J. C. Gillies, Nooksack.

NEW COMPANIES.

FAYETTE, ALA.—The Fayette Telephone Company, of Fayette, has been incorporated with a capital stock of $2,000. Incorporators: W. J. Johnson, V. J. Johnson and F. T. Johnson.

PLEASANT HILL, ALA.—The Pleasant Hill & Selma Telephone Company, of Pleasant Hill, has been incorporated with a capital stock of $2,000. Incorporators: T. E. Knight, N. B. Rudulf, T. B. Feets, B. S. Harrell, J. P. Stringer and others.

BLACK SPRINGS, ARK.—The Black Springs Telephone Company, of Black Springs, has been incorporated with a capital stock of $5,000. Incorporators are: W. C. Rowton, J. M. Rowton, W. C. Wassen, C. C. Welch, M. W. Philpot, J. D. Robbins, J. A. Abernathy, J. A. Reece, L. B. Bates and G. Cox.

FORRESTON, ILL.—The Forreston Mutual Telephone Company, Forreston, has been incorporated with a capital stock of $5,000. Incorporators: Henry Zumball, Henry Rabmeyer, Joseph Duitman.

ELDON, IA.—The Farmers' & Merchants' Mutual Telephone Company has been incorporated with a capital stock of $6,000. S. S. Glotfelty, president; J. H. R. Spilman, vice-president; H. J. Israel, secretary; Elmer E. Hilles, treasurer.

MAURICE, IOWA.—The Sherman Telephone Company has been organized with a capital stock of $2,000. Incorporators are: J. C. Emery, Geo. R. Moir, K. H. DeJong, Wm. Brink and others.

NEWS—WANTED

THE matter contained upon the Message and Operating Field pages of this paper is contributed largely by our special correspondents. We believe, however, that there are many valuable items of telephonic interest which are never brought to the attention of the public. There is no reason why this condition should exist, and the Editor, therefore, invites all telephone companies, and the officials of such companies, to furnish any information that they can consistently make public relative to financial statistics, new construction, elections, franchises and personal items.

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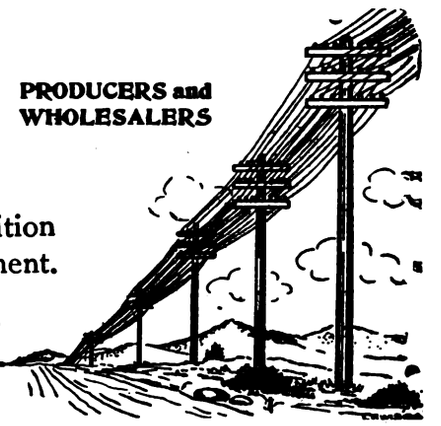

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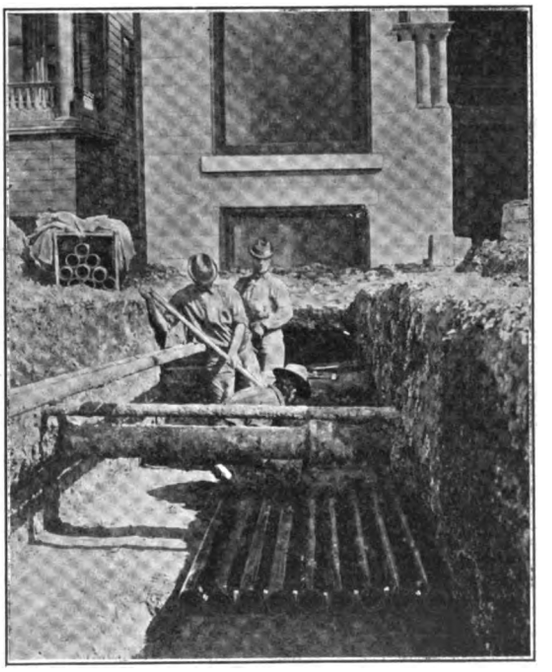

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THE WEEK'S MESSAGES

ALTON, KAS.—The Alton Mutual Telephone Company has been incorporated with a capital stock of $4,000.

RAY, KAS.—The Homestead Telephone Company has been incorporated with a capital stock of $5,000.

ST. JOHN, KAS.—The Seward & St. John Telephone Company has been incorporated with a capital stock of $2,000.

CHAMBERS, KY.—The Chambers Telephone Company, Chambers, has been incorporated with a capital stock of $1,000.

MONTROSE, MISS.—The Jasper Telephone Company, Montrose, has been incorporated with a capital stock of $1,500. Incorporators: L. L. Denson, B. L. Blackwell and others.

GILEAD, NEB.—The Gilead Home Telephone Company has been incorporated with a capital stock of $6,000. Incorporators: J. W. Deaver and others.

TECUMSEH, NEB.—The Johnson County Home Telephone Company has been incorporated with a capital stock of $50,000. The incorporators are: J. H. Luneman, W. W. Waganer, Otto Wettsetin, N. Bolton, John Barsby, E. E. Cobb, E. K. Cobb, G. W. Bearnes.

MILFORD, N. J.—The Delaware Valley Telephone Company, Milford, has been incorporated with a capital stock of $5,000. Incorporators: Alton C. Rapp, Mahlen W. Angell, William H. Farrand and others.

BATH, N. Y.—The Bath-Hammondsport Telephone Company has been incorporated with a capital stock of $5,000. Incorporators: James W. Brundage and William Dildine, Bath, and James H. Smellie, Hammondsport.

FRANKLINVILLE, N. Y.—The James Telephone Company has been organized.

GILBERTSVILLE, N. Y.—An Independent Telephone Company has been organized at Gilbertsville, with the following officers: President, Alvin R. Converse; vice-president, Marcus Terrell; secretary and treasurer, William Peabody.

RICHWOOD, O.—J. L. Sayre, of Richwood, Union Co., is organizing a company to erect a telephone exchange at Ostrander and give service to the district between Marysville and Delaware. It will probably connect with the system at Columbus. The company will be capitalized at $10,000.

PERSONAL.

H. W. BARNARD, formerly with the Ithaca Telephone Company, has accepted a position with the Automatic Electric Company, of Chicago.

A. B. FEGAN, formerly manager of the Home Telephone Company, of Albion, N. Y., is now manager of the Ithaca Telephone Company, of Ithaca, N. Y.

J. S. GILLENTINE, local manager of the Cumberland Telephone & Telegraph Company at Crowley, La., has been transferred to Lake Charles.

FRANK J. HANNA is to be manager of the plant of the Home Telephone Company, at Dayton, O.

WALTER HARDINGER, formerly manager of the Ithaca Telephone Company, is now in charge of construction work for the Empire Electric Construction Company, in Portland, Oregon.

EVAN JOHNSON, formerly factory superintendent of the National Telephone & Telegraph Company, of Philadelphia, has become associated with the Automatic Switch Telephone Company, of that city, and will devote his time to the development of intercommunicating apparatus.

J. P. McHALE, formerly manager at Durant, I. T., has been appointed special inspector of the system of the Pioneer Telephone Company.

A. J. THOMAS, who has managed the office of the Cumberland Telephone & Telegraph Company in Abbeville for some years, will take charge of the exchange at Crowley, La.

MISCELLANEOUS.

MONTREAL, QUE., CAN.—The city has won its case against the Bell Telephone Company and in future the company will be obliged to pay a tax of $5 on each slot machine in use.

BOWLING GREEN.—D. A. Yoder, of Toledo, who makes a specialty of handling telephone securities and who is a stockholder in the Wood County Telephone Company, which concern recently acquired the plant of the North Baltimore Telephone Company, of North Baltimore, O., reports that the latter plant made a net gain of 20 subscribers during the month of November. The Wood county concern owns 90 per cent. of the North Baltimore plant, but the old company will not be dissolved until the entire stock in the North Baltimore plant has been transferred into Wood county securities. The company is planning to make a special drive for rural business within a very short time.

TOLEDO, O.—The Toledo Home Telephone Company has been busily engaged on a new directory, which will contain the names of close to 10,000 subscribers.

New Construction in the Field

PERRY, GA.—The Houston Telephone Company has recently built a line connecting this place with the lines of the Elko-Grovania Telephone Company at Elko. Further extensions under consideration will carry the company's lines to Henderson, and thence to Ashburn, through Emerick, Unadilla, and Vienna. The line from Perry to Tivolia will be extended to Kathleen.

BUDA, ILL.—The Empire Telephone Company is putting in a new line from Buda to Bradford.

BLOOMINGTON, ILL.—The Bloomington-Kinloch Telephone Company is placing its wires underground.

RIDGEFARM, ILL.—The Vermilion County Telephone Company has just completed the construction of a line from the Danville exchange to Indianola, via Georgetown and Ridgefarm.

ANAMOSA, IA.—The Jones County Telephone Company is to place some of its wires underground.

MAPLETON, KAS.—The Osage Valley Telephone Company is to install a rural exchange at Mapleton.

HARBOR BEACH, MICH.—The Harbor Beach Telephone Exchange proposes extending its rural lines in all directions from Harbor Beach.

DULUTH, MINN.—The Duluth Telephone Company expects to open a branch telephone exchange at Lakeside for the Lakeside and Lester Park service of its system.

STAPLES, MINN.—The Cass County Mutual Telephone Company has practically completed its new line from Staples to Leader, Ellis and Esterdy, and connects with the Motley line.

JOPLIN, MO.—The Joplin Home Telephone Company has completed the construction of a line from Carthage to Neosho, touching Granby, Diamond and Fidelity. This is an additional circuit to those recently furnished into Saecoxie.

ITHACA, N. Y.—The Ithaca Telephone Company will shortly commence the installation of an additional five miles of underground and aerial cable. It will also enlarge its offices and add three sections to its switchboard.

JORDANVILLE, N. Y.—The Jordanville Telephone Company is extending its lines.

LANCASTER, N. Y.—The Inter-Ocean Telephone Company, of Buffalo, is to construct a line in Lancaster.

ASHEBORO, N. C.—The copper circuit now running from High Point to Randleman is to be extended from Randleman to Asheboro by the Asheboro Telephone Company.

ASHLEY, O.—The Ashley Telephone Company is soon to construct lines to Shawton, Bennington and Marengo.

MT. BLANCO, O.—The Rams Horn Telephone Company contemplates the construction of a line from Mt. Blanco to Prattsville.

MORROW, O.—The Valley Telephone Company is extending its lines from Morrow to Osceola and Hicks Station.

TOLEDO, O.—The Toledo Home Telephone Company has ordered $40,000 worth of 300 pair cable, and work will soon begin at drawing it through a portion of the extensive conduit system recently completed.

CONESTOGA, PA.—The Conestoga Telephone Company is building a line to South Birdsboro.

KLEINFELTERSVILLE, PA.—The new telephone line from Kleinfeltersville to Richland and Newmanstown is rapidly nearing completion. It will probably be ready for service in a few weeks.

SMOCK, PA.—The Tri-State Telephone Company is building a new line from Smock to Perryopolis. The line is about five miles in length, and will probably be completed about February 1st.

MANSFIELD, TEXAS.—The Mansfield Telephone Company has increased its capital from $8,000 to $16,000, and will extend its lines.

NORTH VANCOUVER, B. C., CAN.—The British Columbia Telephone Company is installing a telephone system in this town and the company claims it will be completed within three months. Address R. H. Sperling, general manager, Vancouver.

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Vol. 12 NEW YORK—DECEMBER 30, 1905—CHICAGO Number 27

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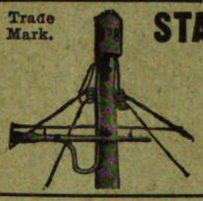

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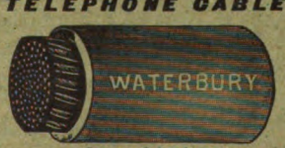

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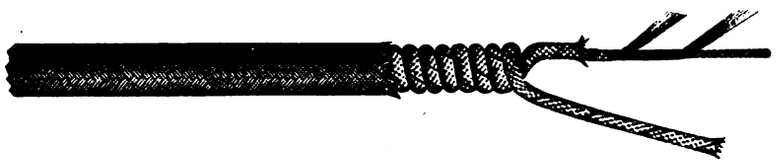

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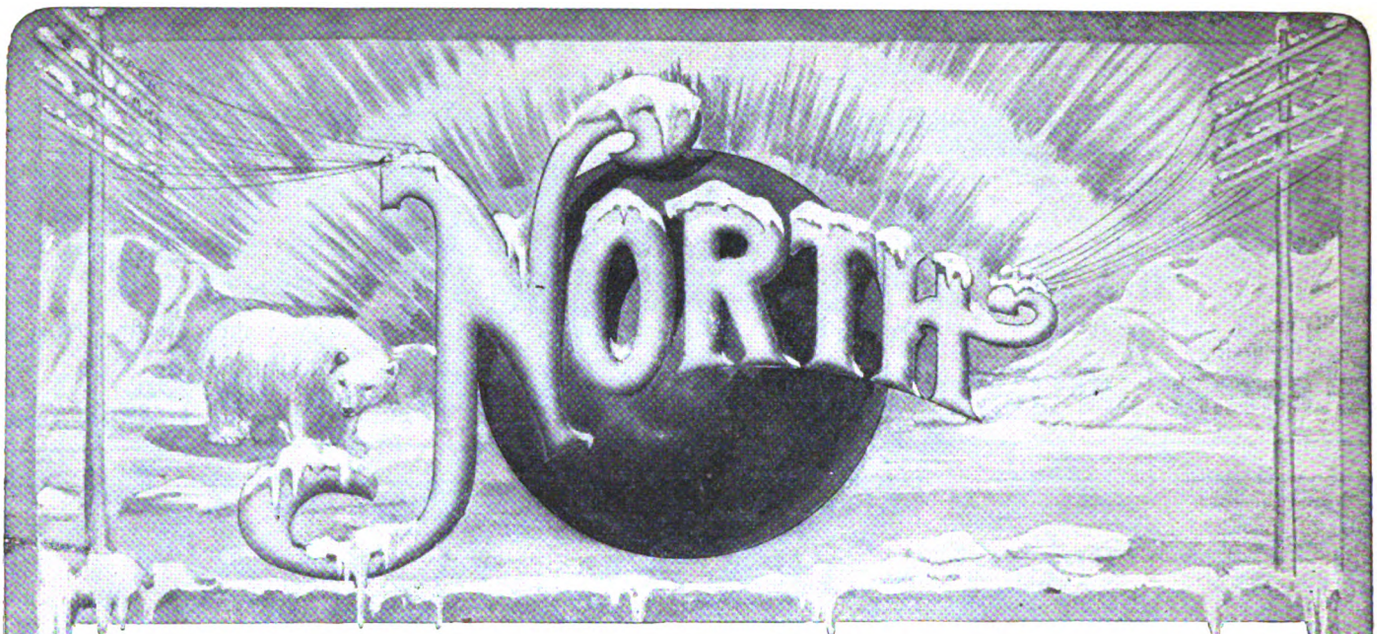

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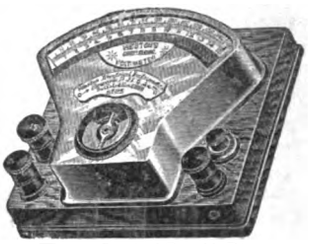
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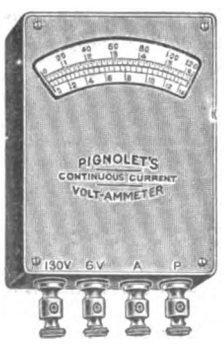

Suppose you have a line in trouble—grounded or open. You don't know the exact location, but you send out a troubleman to hunt it up and clear it. It may take him an hour or a day. Meanwhile the subscriber is getting hot under the collar and saying things about telephones in general and yours in particular.
If you have a Pignolet voltmeter or volt-ammeter you can determine the approximate location and also get an idea of the nature of the trouble. With the information your troubleman can find the fault in jig time, and you will have prevented the subscriber kicking by giving him service at the earliest possible moment.
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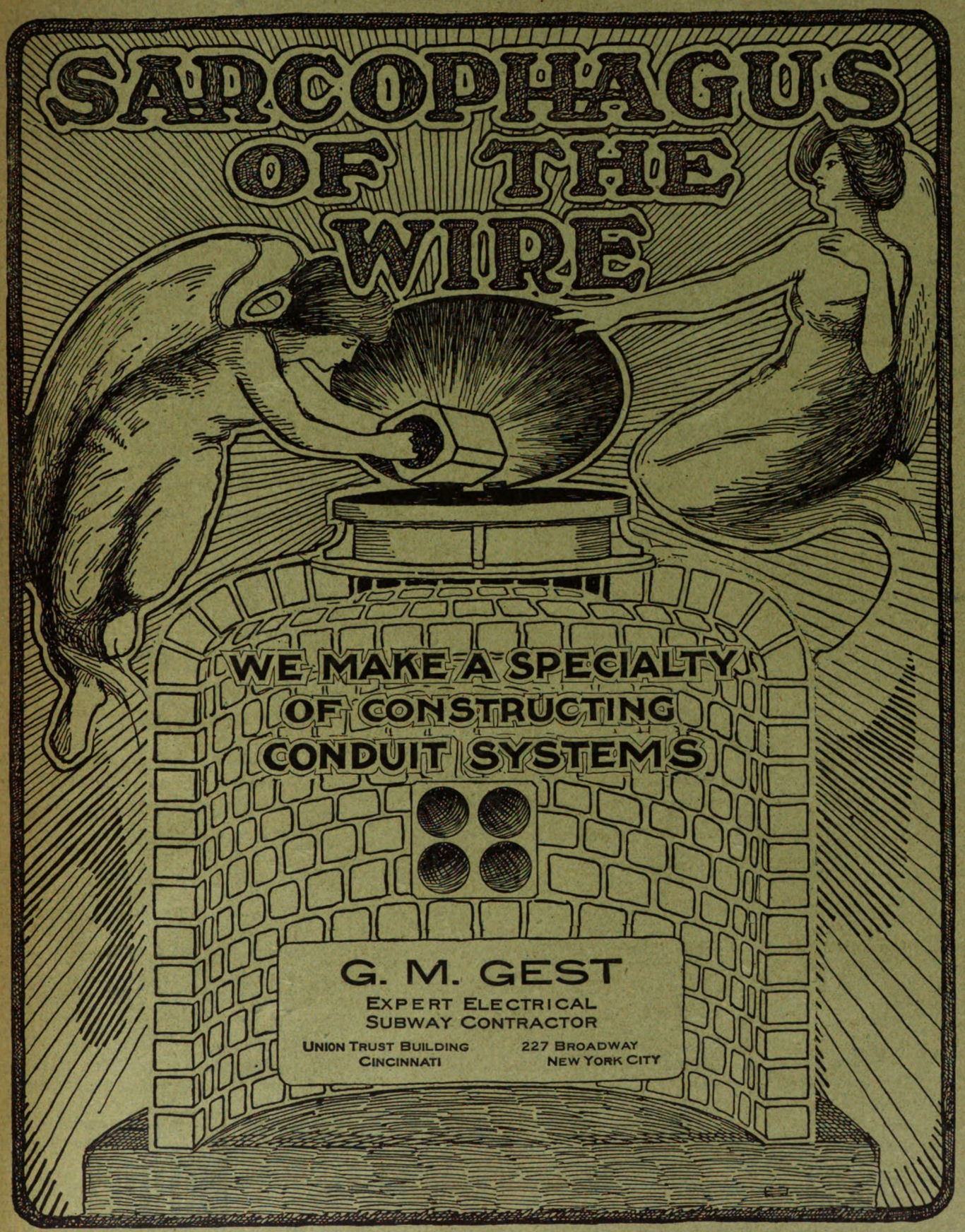

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4 NOTICE 4

¶ On September 5, 1905, the United States Patent Office issued to Oscar M. Leich the dominating patent on Selective Four-Party Telephone Ringing Systems, covering all present practical forms of high and low frequency systems, together with all so-called harmonic or different frequency arrangements.

¶ This Patent was filed in Patent Office February 9, 1900, more than two years before the so-called "Harmonic" patent application, and said "Harmonic" patent is only a detail and not a fundamental patent.

¶ The evasion of infringement of our patent is not accomplished by the adjusting (tuning) of the ringer by the application of weights, springs, etc.

¶ Our Patent No. 799,010 covers all reactive means such as condensers of varied capacity, impedance coils, etc., for operating Selective Ringers whether adjusted (tuned) or not, and no merely adjusted (tuned) ringer can be operated in practice without employing some kind of reactive means such as above described, and the mere addition of weight, adjusted (tuned) springs or the like, does not evade the claims of our broad patent.

¶ We can furnish the Leich Four-Party Different Frequency System with or without using the ground for return circuit.

¶ We are sole licensees under said patent.

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